(NAVY) NAVAIR 17-15-50.1
(ARMY) TM 38-301-1
(AIR FORCE) T.O. 33-1-37-1

JOINT OIL ANALYSIS PROGRAM MANUAL

VOLUME I

INTRODUCTION, THEORY, BENEFITS, CUSTOMER SAMPLING PROCEDURES, PROGRAMS AND REPORTS

This volume is one in a series of four volumes and is incomplete without volumes II, III and IV.

Published by direction of Commander, Naval Air Systems Command under the authority of the Joint Oil Analysis Program Regulation.
AFR 400-68/AR 700-132/OPNAVINST 4731.1.

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LIST OF EFFECTIVE PAGES

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By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R.L. DILWORTH
Brigadier General, United States Army
The Adjutant General

Distribution:

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SECTION I

INTRODUCTION

This volume was prepared under the technical cognizance of the Joint analysis Program Technical Support Center, Pensacola, Florida. Comments and recommendations pertaining to this volume should be submitted in accordance with instructions in paragraph 1-6.

1-1. Purpose. The Joint Oil Analysis Program (JOAP) was established by the Joint Army, Navy and Air Force regulation as a combined effort to establish and maintain a standard program that would consolidate and coordinate the three separate service oil analysis programs. The purpose of Volume I is to clarify the use of oil analysis as a diagnostic maintenance tool, to standardize JOAP operating procedures and to provide general guidance for JOAP managers and customers in accordance with the Tri-Service Regulation (AFR 400-68/AR700-132/OPNAVINST 4731.1). Specific JOAP Laboratory operating procedures and guidance are contained in Volume II. The JOAP equipment wear-metal criteria listings which contain trend tables and decision making guidance for laboratory use in evaluating oil sample analysis results and determining actions required are contained in Volumes III and IV for aeronautical and non-aeronautical equipment, respectively.

1-2. Applicability. The provisions of this volume apply to all activities of the Departments of the Army, Navy, Air Force and the Coast Guard participating in the JOAP and to laboratories operating under contracts therewith. Laboratory services provided by JOAP laboratories to customer activities will be in accordance with instructions contained in this manual.

1-3. Program Guidance. Guidance for the JOAP and Departments of the Army, Navy, and Air Force Oil Analysis Programs is provided by the following references:

a. Joint Oil Analysis Program:

(1) Tri-Service: AFR 400-68/AR700-132/OPNAVINST 4731.1 Joint Oil Analysis program (JOAP).

(2) Charter for the Joint Oil Analysis Program Technical Support Center (JOAP-TSC).

(3) Charter for Joint Oil Analysis Program Coordinating Group (JOAP-CG).

(4) Charter for the Joint Oil Analysis Program Executive Committee (JOAP-EC).

b. Military Departments:

(1) Army: AR750-1 Army Material Maintenance Policies. This publication is contained in the Maintenance Management UPDATE.

(2) Navy: OPNAVINST 4790.2 Naval Aviation Maintenance Program (NAMP).
NAVAIRINST 4731.1 Navy Oil Analysis Program for Aeronautical Equipment.

(3) Air Force: AFI 21-124 Air Force Oil Analysis Program and supplements thereto.

1-4. JOAP Goals. The goals of the Joint Oil Analysis Program are to:

a. Improve the operational readiness and economy of military equipment by the effective use of oil analysis.

b. Collect and analyze technical data in order to:

(1) Increase the effectiveness of oil analysis in diagnosing oil condition and potential equipment failures.

(2) Accumulate engineering data for each phase of a weapon system's or equipment's life.

c. Ensure all Army, Navy, and Air Force oil analysis plans and operations are integrated within the JOAP to provide.

(1) Standardization of analytical techniques, procedures, data collection, calibration standards, and instrumentation/equipment.

(2) Interservice oil analysis support to all military departments.

(3) The most cost-effective means of monitoring the condition of lubricating fluid and fluid lubricated mechanical systems.

1-5. Joint Oil Analysis Program Responsibilities. Responsibilities for each service are delineated in the Joint Oil Analysis Program Tri-service Instruction and the Memorandum of Understanding for Support of the Joint Oil Analysis Program.

a. JOAP Executive Committee - a chartered committee established to provide joint service decisions on the Joint Oil Analysis Program (JOAP). The JOAP-EC is responsible for:

(1) Approving policy and strategic planning for the JOAP.

(2) Providing oversight of the Join t Oil Analysis Program Technical Support Center (JOAP-TSC), including establishment of and provision for personnel staffing levels and funding requirements.

(3) Reviewing tasking provided to the JOAP-TSC by the JOAP Coordinating Group (JOAP-CG).

(4) Being the source of final resolution disagreements among services on oil analysis programmatic matters.

b. JOAP Coordinating Group (JOAP-CG) - a chartered committee established to provide the resolution of routine problems in the JOAP and provide an interface among the services for planning and administering the JOAP. It is composed of all service Oil Analysis Program Managers/Directors and the Director of the JOAP-TSC. Additional members from the Marine Corps, Coast Guard or other participating agencies shall be invited as non-voting advisory members of the JOAP-CG. The JOAP-CG is responsible for:

(1) Providing recommendations to the JOAP-EC on JOAP policy and strategic planning at the semi-annual meetings.

(2) Assuring open communications between the JOAP-TSC and the services' Program Managers/Directors to ensure continuity and standardization of policies and procedures within and among the services.

(3) Resolving routine problems occurring among the services and/or the JOAP-TSC.

(4) Assigning non-chartered task s to the JOAP-TSC.

(5) Making recommendations to the JOAP-EC on joint service long range plans and interservice issues.

(6) Reviewing and recommending changes to the tri-service regulation.

MEMBERSHIP

Army Program Director

DSN: 645-0866/COMM 205-955-0866
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Director, Joint Oil Analysis Program Technical Support Center

DSN: 922-5627 ext 100/COMM 850-452-5627 ext 100
FAX: 922-2348/COMM 850-452-2348
MESSAGE: DIRJOAP TSC PENSACOLA FL//00//
MAILING: DIRECTOR
JOAP TSC
85 MILLINGTON AVENUE
Pensacola, FL 32508-5020

c. JOAP Technical Support Center (JOAP-TSC): A jointly staffed organization that is established to provide coordinated fluid analysis and technical support for the Army, Navy, and Air Force. The JOAP-TSC is responsible for:

(1) Producing reference/calibration fluid standards for the JOAP, including development and maintenance of the standard operating procedures for the manufacture and quality verification, ensure periodic validation of reference/calibration fluid standards, control and inventory of both reference and calibration standards, and perform quality assurance and/or acceptance testing on JOAP electrodes or fluids as required on a reimbursable basis.

(2) Conducting a laboratory certification program for the U.S. Armed Forces.

(3) Conducting a laboratory correlation program for the JOAP.

(4) Testing and evaluating non-development (off-the-shelf) equipment for joint applicability as directed by the JOAP Coordinating Group (CG).

(5) Preparing and maintaining technical oversight for the JOAP Manual (NAVAIR 17-15-50, TM 38-301, T.O. 33-1-37, Volumes I through IV) and other JOAP technical documents. Coordinating resolution of service differences and providing changes to the field.

(6) Operation of JOAP certified laboratory.

(7) Serving as a clearinghouse for technological interchange among the services. This includes, but is not limited to, developing, maintaining, and disturbing documents such as the JOAP Manual, oil analysis program directories, correlation reports, customer lists, newsletters, and other documents as needed. Conducting meetings, conferences, and symposiums for the purpose of technological exchange. Coordinating with other agencies, civilian companies, universities and other countries and reporting on emerging technologies. Providing statistical, analytical, management, technical, and other reports to equipment engineers, program managers/directors, field activities, and other service offices.

(8) Providing technical assistance to all participating field activities for instrument operation and maintenance.

(9) Providing guidance and oversight for the curriculum presented in the JOAP operator/evaluator course and other JOAP training.

CONTACT POINT

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d. Laboratories:

(1) Process and evaluate customer samples as soon as possible during normal work hours. Processing and evaluation priority is as follows:

(a) Special aeronautical
(b) Routine aeronautical
(c) Special non-aeronautical
(d) Routine non-aeronautical

(2) Provide recommendations to customer activities based upon analytical results of customer samples.

(3) Participate in the JOAP Correlation Program.

e. Customers: Customer responsibilities are included in Section III of this volume.

1-6. Manual Change Procedures.

a. General. JOAP manual users desiring technical and/or procedural changes shall provide feedback via their appropriate oil analysis program manager/director to ensure coordinated directive updating. The program manager/director will screen proposed changes for validity and forward recommended changes to the JOAP-TSC for technical review and coordination with all service program managers/director and engine/equipment managers, as applicable. Procedural and technical changes are not authorized for program application until formally released.

b. JOAP Manual Update Methods. The Navy is the lead service for publication of this manual; therefore, the following Navy publication change procedures apply:

(1) Revision. A revision is a complete document reissue with all change information incorporated.

(2) Routine changes. Technical manual changes are the official corrected pages to a portion of an existing document. They consist of replacement change pages for that area of the manual affected by the change action. This approach provides an economical and efficient method of issuing new or corrected material to the user. However, routine changes are dependent upon funding availability and normally require 6 months processing time.

(3) Rapid action changes. Rapid action changes are issued in order to provide the operating forces and maintenance personnel with accurate and timely information necessary for mission performance.

(a) Rapid action changes shall be prepared and issued when any of the following conditions exist:

1. Hazards to safety of personnel.

2. Impairment of safety of flight.

3. Aircraft grounding.

4. Mission capabilities adversely affected.

5. Potential equipment damage.

(b) Rapid action changes may be issued as Interim Rapid Action Changes (IRAC) or as formal Rapid Action Changes (RAC). Interim Rapid Action Changes are issued as Naval messages to expedite the release of urgent and essential operational and maintenance change information. Army and Air Force program management offices are responsible for retransmittal of IRAC's to appropriate service addresses.

(c) Formal Rapid Action Changes are issued as insert change pages prepared in the same style and format of the technical manual being changed and as a replacement for an IRAC. A Formal RAC or routine change containing IRAC change material must be issued within one year of the release of an IRAC.

Note: All four volumes of the JOAP Manual are on-line at: http:// www.natec.navy.mil. You must register to use the site, including entering a user name and obtaining a password for access to the manuals. Be prepared to provide a Distribution Account Code (DODAC). Each installation has a unique code. Check with your local Supply representative for the DODAC number to use. Some users, depending on the laboratory status (contractor, foreign, etc.) may have to submit special paperwork to NATEC to obtain access. Generally, if your e-mail address ends with ".mil", you should be able to register and obtain a password very quickly. Contact the trouble desk (see information below) to get help with registering on-line or to inquire about any special registration requirements. Make sure that your Adobe Acrobat version is 4.0 or higher. If not, there is a link on the site to get the latest version. If you do not have version 4.0, all of the manuals may not display correctly on your computer.

Contact Mike Cassady by e-mail at the JOAP-TSC for any general questions concerning the site at: mcassady@joaptsc.navy.mil

JOAP Manual Designations by Service:

US Army	TM 38-301-1 / -2 / -3 / -4
US Navy	NA 17-15-50.1 /.2 /.3 /.4
US Air Force	T.O. 33-1-37-1 /-2 / -3 / -4

Once the start page has loaded, click on "Access Technical Data (Manuals, IRAC's, etc.)", which is at the top left of the start page.

Enter your user name and password and click on "Login". Just click on "Technical Manual Search". You do not need to enter a "Platform" (weapon system). "Search The Manual Numbers" will be selected by default. Just below, enter your service designation for the manuals, such as 33-1-37 for the US Air Force, 17-15-50 for the US Navy, and 38-301 for the US Army. Ensure that you do not use the "T.O.", "NA",, or "TM" prefixes as there will be no match if the prefix is used. Regardless of which of the three numbers are used, the same manuals will be displayed. Click on the link for the volume that you want. You can save the manuals to your computer. You are required to check the website for any changes every 30 days. If you are searching for a particular engine, or keyword, you can hit "Ctrl/F" and enter the search word(s).

POC's At NATEC (the hosts for the Internet Manuals)

Trouble Desk:

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e-mail: harderdj@navair.navy.mil

Note: Although the US Navy site is considered the official JOAP Manual site, the US Air Force has also placed the JOAP Manuals on the internet. You can gain access to the four volumes of T.O. 33-1-37 if you have a ".mil" e-mail address at: https://137.240.78.49/til/tild/tildt-home.htrnl#techorder

1-7. Requirements for Procurement, Relocation and Repair of Oil Analysis Equipment. All requirements for procurement, relocation or repair of oil analysis spectrometers and ancillary equipment shall be submitted to the appropriate Service Program Managers/Director in sufficient time to allow interservice coordination of the action, if required. Detailed instructions for obtaining repair of spectrometers are contained in Volume II.

NOTE

During periods of shutdown such as shipyard repair or shop renovation, laboratory managers will ensure that JOAP laboratory personnel protect the spectrometer with a plastic covering. Seal off the spectrometer form possible contamination for dust and/or water by using tape to secure the plastic covering.

1-8. Relocation of Oil Analysis Using Organization/Customers. Any time that an oil analysis customer relocates, either deployed or permanently, and oil analysis services are required at the new location, the transfer of workload and provision of services shall be handled through the normal chain of command in order to ensure orderly transfer of support. Unusual problems encountered should be referred to the appropriate service oil analysis program management office for resolution.

a. When it is known that away from home base oil analysis support will be required on extended duration transit flights, transferring customers are responsible for obtaining complete oil analysis records for their equipment from the losing laboratory and for delivery of the records to the gaining laboratory at the new operating site. If sufficient time is not available to comply with these procedures prior to departure, the customer shall notify the losing laboratory concerning the relocation and the losing laboratory shall mail or electronically transfer all required oil analysis records to the gaining laboratory.

b. Deployment/Permanent Relocation. Transferring activity (Customer). The customer activity is responsible for notifying the home base supporting oil analysis laboratory concerning transfer/deployment schedules in advance of departure. Advance notice is required in order to provide the laboratory sufficient time for orderly processing of records for transfer to the new supporting laboratory to avoid disruption in equipment oil analysis monitoring schedules. The losing laboratory will forward equipment oil analysis records directly to the receiving laboratory unless directed otherwise by competent authority. The losing laboratory shall ensure that each equipment record transferred is complete, accurate and legible. When the customer returns to home base, records of analysis done at intermediate locations must be delivered to the regular supporting laboratory. If the customer departs prior to receipt of the completed record, the intermediate laboratory will forward the completed record to the regular supporting laboratory.

1-9. Requests from Foreign Countries. Requests from foreign agencies for JOAP technical information, assistance, equipment, spare parts, consumable supplies, etc. under Mutual Assistance Programs (MAP), Foreign Military Sales (FMS), Grant Aid Programs or other mutually beneficial programs should be addressed to the nearest United States Military Advisory Group for consideration and/or processing. Requests from foreign countries for participation in the JOAP Correlation Program are addressed in Section IV of this volume.

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SECTION II

OIL ANALYSIS THEORY AND BENEFITS

2-1. Spectrometric Oil Analysis. Spectrometric oil analysis is a diagnostic maintenance tool used to determine the type and amount of wear metals in lubricating fluid samples. Engines, transmissions, gearboxes, and hydraulic systems are the types of equipment most frequently monitored. The presence of unusual concentrations of an element in the fluid sample can indicate abnormal wear of the equipment. Once abnormal wear is verified, the equipment may be repaired or removed from service before a major failure of a fluid wetted component occurs. Spectrometric oil analysis enhances personnel safety and material readiness at a minimum cost, and serves as a decisive, preventive maintenance tool.

2-2. Physical Property Testing. Lubricant physical property testing provides data on conditions that are standards of measurement for judgment of the quality of the oil. Physical property tests aid in determining degradation or contamination of the lubricant which occur from combustion blow -by, oxidation from overheating, moisture from coolant leaks, additive depletion, etc. Physical testing of used lubricants is primarily utilized in ground and ship equipment applications but may also have some beneficial application to aeronautical equipment as an adjunct to spectrometer testing.

2-3. Benefits of Oil Analysis. Data from spectrometric and/or physical property testing may be used as guidelines to assist in identifying incipient mechanical failures or in determining the quality and useful life of the oil. Thus, potential equipment component wear or failure and premature lubricant failure may be detected prior to a major equipment failure or an expensive repair/rebuild. Oil analysis may also be used to identify inadequate or improper maintenance procedures and unsatisfactory equipment parts/components/assemblies.

2-4. Wear Metals. Wear metals are generated by friction between moving metallic surfaces in mechanical systems. Despite lubrication, wear -metal generation occurs in all o il wetted systems to some degree and the lubricant serves as a repository for the wear metals. Wear metals may also be generated from corrosive action resulting from moisture and electrolytic action within lubricated systems. Thus, information related directly to the condition of the assembly exists in the circulating lubricating fluid. This conclusion is developed as follows: first, the metal particles rubbed or gouged off the metal alloy surfaces will always have the same chemical compositions as the alloys from which they came; second, the normal level and rate of production of each kind of metal particle can be established for each type equipment through oil analysis over a period of time. Thus, when an abnormal level and/or rate of production of wear metals is detected, the chemical identity of the abnormally produced particles will provide clues concerning the identity of the parts being worn. Some metallic elements will specifically identify an impending problem while others provide only general information that abnormal wear is occurring, For example, increased quantities of iron are quite common since iron is present in many component parts and the skill and knowledge of the evaluator is important in diagnosing equipment condition and the source of wear metal. On the other hand, increased quantities of an uncommon element such as silver may pinpoint the trouble area directly to a single part. For a normally operating piece of equipment, wear metals are produced at a constant rate. In some cases, the rate may be negligible, but this rate is similar for all normally operating equipment of the same model. The wear -metal concentration will also increase at a constant rate for a normally operating, completely enclosed system with no fluid consumption. A theoretical plot of wear -metal concentration in parts per million (PPM) vs operating hours is represented in figure 2 -1. Any condition which alters the normal relationship or increases the normal friction between moving parts will generally accelerate the rate of wear and increase the quantity of wear -metal particles produced. An abnormal condition of this type will sharply increase the concentration and rate of buildup of wear metals in stable fluid systems. If the condition is not discovered and corrected, the deterioration will continue to accelerate, usually with major secondary damage to other parts of the assembly, resulting in the eventual failure of the entire assembly. (Newly overhauled assemblies may tend to produce wear metal in higher concentrations during the initial break -in period.)

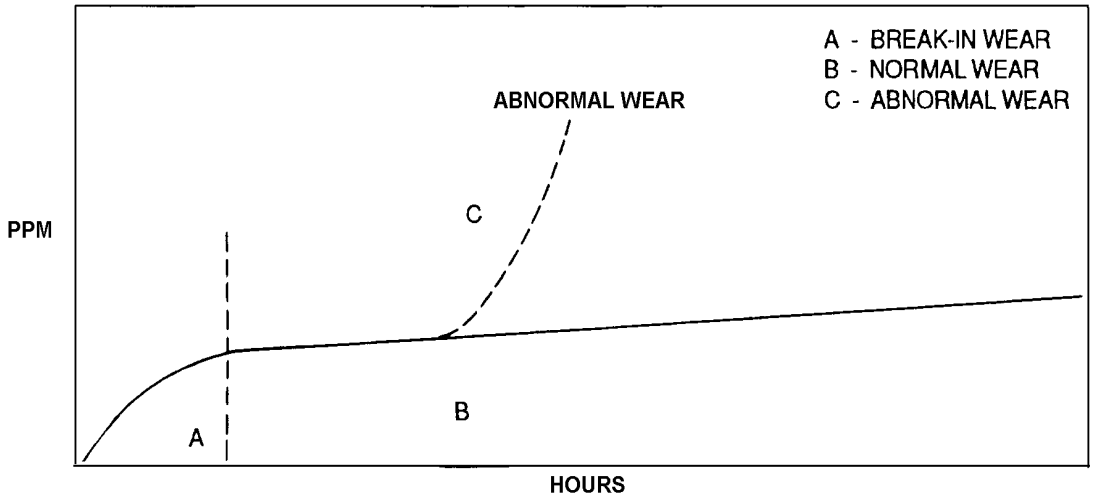

Figure 2-1. Wear Metal Concentration Vs. Operating Hours

2-5. Identification and Measurement of Wear Metals . Wear metals produced in fluid lubricated mechanical assemblies can be measured in extremely low concentrations by spectrometric analysis of fluid samples taken from the assembly. The two analytical instruments for spectrometric oil analysis currently used by the services are atomic emission and atomic absorption instruments.

a. Atomic Emission Spectrometer. An emission spectrometer is an optical instrument used to determine the concentration of wear metals in lubricating fluid. The analysis is accomplished by subjecting the sample to a high voltage spark or plasma which energizes the atomic structure of the metallic elements, causing the emission of light. There are two commonly used types of emission spectrometers, Atomic Emission Rotrode (AER), and Inductively Coupled Plasma (ICP). Laboratories certified under the Joint Oil Analysis Program utilize the AER spectrometer. The emitted light is subsequently focused into the optical path of the spectrometer and separated by wavelength, converted to electrical energy and measured. The intensity of the emitted light for any element is proportional to the concentration of wear metal suspended in the lubricating fluid.

b. Atomic Absorption Spectrophotometer. An atomic absorption spectrophotometer is an optical instrument used to determine the concentration of wear metals in the lubricating fluid. The sample is aspirated into a flame and vaporized. The molecular structure of the wear metal compounds is reduced to ground state atoms by the high temperature. Light energy having the same characteristic wavelength of the element being analyzed is radiated through the flame. The resultant light which is not absorbed is converted to electrical energy and measured electronically. The amount of light absorbed by the elements in the flame is proportional to the concentration of wear metal suspended in the lubricating fluid.

c. Spectrometric Oil Calibration Standards. JOAP oil standards consist of a base oil containing precisely controlled quantities of dissolved metallo -organic elements and stabilizing agents, with controlled viscosity and flash point for calibrating/standardizing both atomic emission and atomic absorption spectrometers.

(1) JOAP oil standards are available in 8 -ounce bottles through normal supply sources as stock numbered items.

(2) The D-3 standard, has an assigned shelf/service life of 12 months with no extensions authorized.

Designation	Elements	Concentration	Shelf Life
D-19	None	0	N/A
D-3	B, Mo, Zn	100	*12 months
D-12	Fe, Al, Cr, Cu, Pb, Na, Mg, Ni, Si, Ag, Sn, Ti	**5, 10, 30, 50,100, 300	*30 months

* Shelf/service life assigned is finite with no extensions allowed. Standards reaching service life shall be locally disposed of in accordance with applicable service regulations.
** The 5 PPM concentration is not applicable to AOAP laboratories.

(3) Stocking Standards. Local supply departments are prohibited from maintaining standards in stock due to shelf life control requirements. Standards ordered through local supply activities will be forwarded from the stocking point. Therefore, it is recommended that laboratories frequently inventory standards on hand and order replacement stock 30 to 45 days in advance of anticipated requirements.

2-6. Spectrometric Limitations. The spectrometric/spectrophotometric fluid analysis methods detect only small particles and are effective in detecting those failures characterized by an abnormal increase in the wear -metal content of the lubricating fluid. This is particularly true of failures that proceed at a rate slow enough to permit detection by the laboratory. Examples of both detectable and undetectable failures are listed below.

a. Detectable Failures.

(1) The following are good indicators of impending engine/component failure:

(a) A slow, progressive wear -metal concentration buildup above established abnormal criteria.

(b) A series of rapid wear-metal concentration increases occurring below established abnormal criteria.

(2) Typical sources of wear found in detectable failures.

(a) Jet/Turbine Engines. Worn bearings (balls, cages, races), bearing seals and retainers, bearing housings, constant speed drives, oil pump gears, and gearbox castings.

(b) Reciprocating/Internal Combustion Engines. Worn bearings, crankshafts, cylinder walls, oil pump gears, piston pin bushings, piston rings, push rods, rocker arms, valve guides, and valve springs.

b. Undetectable Failures.

(1) Catastrophic failures. Sudden failures not preceded by characteristic wear -metal generation, such as fatigue failure, cannot be detected by spectrometric oil analysis techniques now in use.

(2) Failures with no wear -metal indications. Equipment failure may occur when metal particles too large to be detected by spectrometric methods are generated without the accompanying normal wear -metal generation pattern that oil analysis is designed to detect.

2-7. Practical Considerations.

a. Sample Integrity. The value of spectrometric analysis and the subsequent utilization of this analysis by the evaluator is based on the assumption that the oil sample is representative of the system from which it was taken. If the oil is not truly representative of the system, the analytical results are totally useless. Occasionally, samples from one component may be erroneously substituted for another, resulting in what may at first appear to be a developing wear condition for one of the components. Closer inspection of results will often reveal these discrepancies. Any sudden increase of wear -metal in one component and decrease in another, within the same weapon system/end item, should be viewed as a problem related to mislabeling of samples, i.e., misidentifying a sample as an engine sample when it was actually a transmission, or reversing left and right engine samples.

b. Contamination. Contamination is the problem that most frequently affects sample integrity. Sharp increases in the concentration of wear -metal, water, unusual color, and particulate matter may be indications of contamination, and additional samples may be required to establish the true wear -metal baseline. In some cases, systems may have to be flushed one or more times to remove contaminating substances. The most common contamination found in lubricant systems is dirt and sand which is detected by an increase in silicon. Silicon contamination is a common problem in dry, sandy, or dusty operational areas. Once in the component, dirt and sand are abrasive, and may accelerate wear.

c. Type of Spectrometer. The type of instrument being used to analyze fluid samples has a direct effect on the analytical result and must be considered. The analytical results from an atomic absorption spectrophotometer will generally be lower than the value that would be given by an atomic emission instrument for used oil analysis.

d. Calibration Standards. Calibration standards which are used to standardize the spectrometer have an assigned shelf life. Standards which have exceeded the allowable shelf life may introduce errors into the analytical process that may not be readily detected, particularly if all standards on hand have degraded over the entire standard range of PPM. Calibration standards should be checked for signs of precipitation as an indication of degradation. Refer to Volume II for detailed information concerning calibration standards.

e. Additives. New lubricating fluids normally do not contain any metallic compounds or constituents that would interfere with spectrometric identification and measurement of the wear -metals produced by operation of the major assembly. Occasionally, lubricant manufacturers will use a metallic compound as a fluid additive. Although such additive compounds may only contribute a small amount of metal/chemical to the lubricant, it is necessary for the laboratory to recognize this source of trace materials. An analysis of a sample of new fluid can be used to establish a baseline for determining actual concentration of wear -metals.

f. Corrosion. Internal equipment corrosion may become a factor in oil analysis when water is allowed to contaminate equipment lubricating fluid. Helicopter gearboxes are particularly susceptible to water -induced internal corrosion because of design features that frequently do not protect against water intrusion. Evaluators must be familiar with the corrosion mechanism because corrosion products may easily be mistaken for impending failure indications and the equipment may be unnecessarily removed from service.

g. Fuel Dilution. Engine oil -lubricated systems using leaded gasoline sometimes become contaminated through oil system fuel dilution. Analytical results indicating a high concentration of lead are a good indication that the system is fuel contaminated.

h. New/Rebuilt Engines/Components. New or recently overhauled equipment tends to produce wear-metals at an accelerated rate. During this break -in period, evaluation maybe difficult since wear -metal production maybe higher than normal. The break -in period is about 20 hours for jets, gearboxes and constant speed drives (CSD's) and about 100 -200 hours (depending on RPM) for reciprocating engines. Curves A and B in figure 2-2 show typical plots of operating hours versus wear -metal concentration for most new/rebuilt equipment. After break -in is complete, an oil change may be necessary to reduce wear -metal concentration to normal levels so evaluation criteria can be effectively utilized.

i. Patterns of Wear. Note that in figure 2 -1, the wear-metal concentration level continued to increase gradually as the equipment continued in operation. In actual practice, this may not happen because of the effect of fluid consumption and the replenishment of lost fluid by new fluid. Fluid replenishment usually causes the wear-metal concentration level in a normal engine to "level off" and remain steady. If fluid were replaced as it was lost (rather than at discrete intervals, as is the actual practice), the effect of this oil replenishment on the wear-metal concentration level would be as shown in figure 2 -2. In this hypothetical example, the wear -metal concentration level reaches its steady state following the break -in period and then remains fairly constant. This steady state point is a function of two variables: (1) the rate of fluid consumption and replenishment, and (2) the rate of wear -metal production by internal friction within the equipment. Theoretically, a steady -state condition is never reached but is only approached as a limiting condition. In practice, the steady -state point varies due to changing rates of fluid consumption and wear -metal production.

j. Effects of Fluid Loss/Addition/Change. The smooth curve of figure 2 -2 shows the hypothetical result if fluid was replaced as it was lost. This, of course, is impossible for most items of equipment. Figure 2 -3 shows the effect of periodic fluid addition and a fluid change. In components such as some reciprocating engines, where oil depletion is rapid and replenishment is frequent, concentrations of wear -metals will change erratically. Under these conditions it is best for the oil sample to be taken for analysis just prior to the addition of new oil. An accurate record of time since last oil change or oil addition is a requisite for the evaluator, as he may be misled if this information is incorrectly reported. Eight parts per million iron at 50 hours since oil change may be normal for a turbine engine; however, eight parts per million at 2 hours since oil change may indicate impending failure.

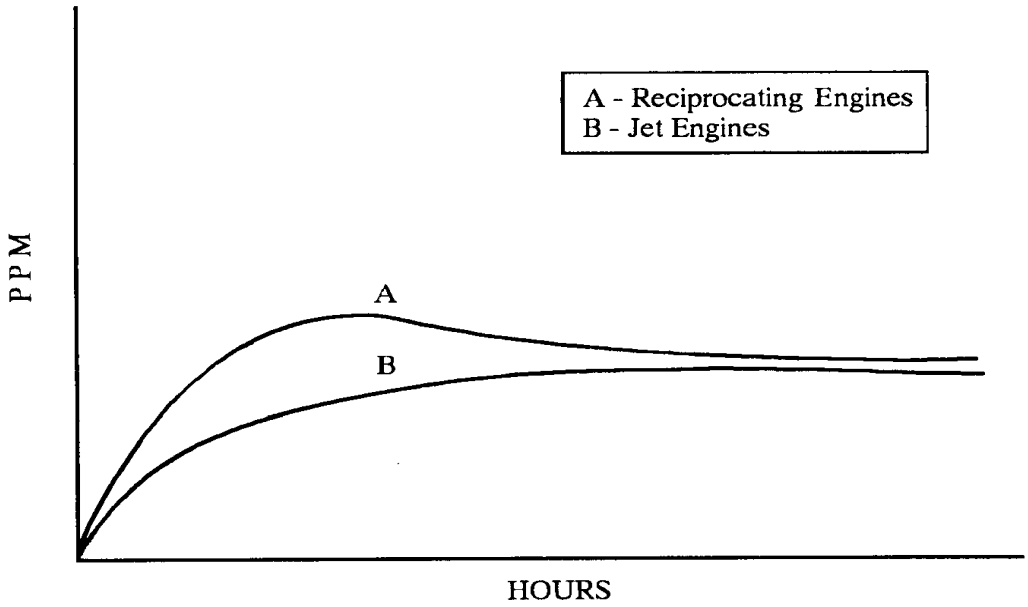

Figure 2-2. Wear-metal Concentration vs. Operating Hours

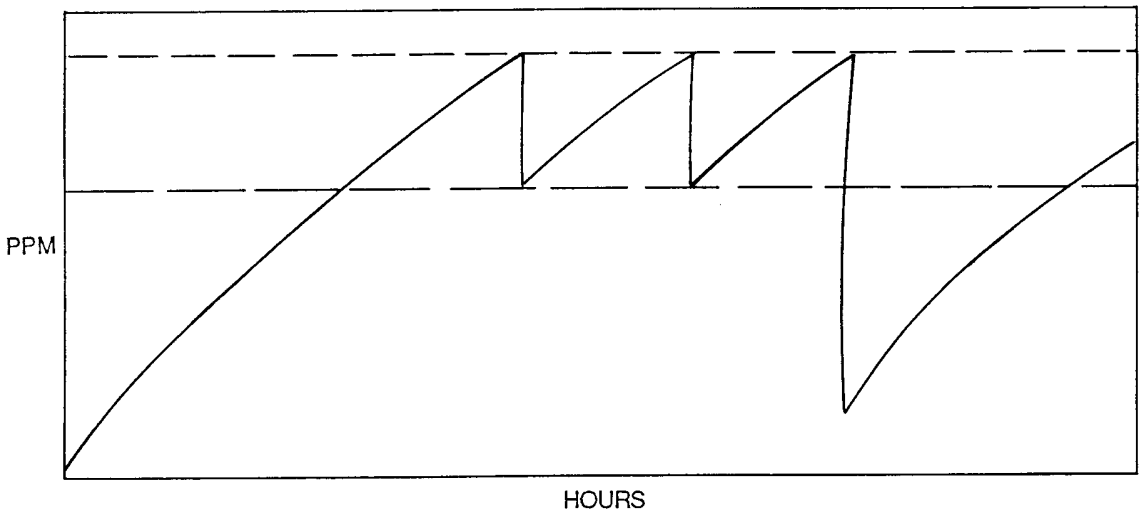

Figure 2-3. Effect of Periodic Fluid Addition and Fluid Change

k. Evaluation Information. Time since new or overhaul must be reported correctly, and the evaluator must remain alert to detect any inconsistencies in these data. When necessary, the customer must be contacted to check on the validity of any suspect values that affect the evaluation. The reporting of an incorrect time for the component may cause the evaluation to request a component removal rather than an oil change or reducing the sampling interval. It is also important that information on component maintenance be reported and considered in the evaluation process.

l. Filter/Screen Checks. Information regarding the examination of filters or screens during routine equipment servicing can often augment spectrometric analysis. Large particles accumulated on filter screens may or may not be accompanied by high spectrometric wear -metal indications. Normally, the wear metals detected and measured by spectrometric analysis are too small to be trapped on a filter screen. Therefore, visible particles on the screen and high wear -metal content (spectrometric) may be detected independently. When large metal particles are detected in the oil system, either on filters or chip detectors, the source of the metal should be determined, if possible, or the equipment should be placed on shorter chip detector/filter inspection and/or oil sampling intervals.

m. Operating Conditions. The mission profile concerns the load factor and manner in which the equipment is operated. Generally speaking, equipment that operates at high percentages of maximum load at all times, will show a higher concentration of wear metals. Extreme operating load factors invite engine and power train problems. Under normal loads and less demanding conditions, most equipment operates at lower, more stable wear-metal concentration levels. Equipment operated intermittently may exhibit symptoms associated with corrosion.

n. Feedback. Operating activity feedback containing maintenance or operating information that may affect the oil analysis results must be included in the evaluation process. For example, a sudden increase in wear metal may indicate a severe wear condition, but may also indicate that maintenance was performed on the component since the last sample was taken. Overboosts, overspeeds, overtemps, cylinder or rings replaced, overtorque, vibration, corrosion found, repair or adjustments on components, color of oil, mission profile information, compressor stalls, unusual noises from the component and filter/screen and chip detector inspections are all bits

of information that will assist the evaluator in making a maintenance recommendation. Incorrect reporting or omission of even the most routine feedback information could adversely affect the evaluator's decision. Oil additions can distort developing wear trends and therefore affect evaluator decisions. The addition of oil between samples may result in abnormally low wear-metal results if the sample is taken immediately following an oil addition. This may be particularly misleading if it occurs when a sample has been requested to verify high results from a previous sample. Tank/sump draining actions done by the customer to reduce or eliminate wear -metal levels will distort trends or mask actual conditions and are prohibited unless coordinated with the monitoring laboratory. All of the above information may affect oil analysis results and should be promptly reported to the laboratory. Details concerning oil analysis feedback requirements and procedures are contained in Section III of this volume.

2-8. Physical Properties Identification and Measurement. The physical properties of lubricating fluids are altered as lubricants degrade and/or become contaminated through service time and temperature, operational conditions and faulty maintenance practices. Important physical properties of lubricants are viscosity, moisture content, flash point, particulate level (solids), acidity/alkalinity and additive content. Physical property tests measure contaminants such as water, atmospheric dirt, fuel, combustion blow -by products, and suspended particulate matter commonly found in used crankcase oils. A brief description of the physical test methods currently in use follows. The specific methods of analysis used to measure the various physical properties of used engine oils are included in Volume If. Physical properties tests on lubricants may be selectively applied to service equipment as determined by applicable service program managers.

a. Viscosity. Lubricating fluids are affected by high temperatures and aeration during service which promote oxidation. This oxidation, if allowed to continue indefinitely, leads to increased viscosity, varnish and sludge. Viscosity decreases are usually attributed to fuel dilution. The viscosity of used lubricating fluids is determined by a viscometer which provides results/data that are converted to absolute viscosity and density readings in centipoise x g/cm3. These readings may be compared to new oil viscosity specifications and provide an indication of used oil condition.

b. Blotter Spot Test. This test is used to determine the presence of sludge in crankcase oils . One or two drops when placed on a piece of blotter paper and allowed to spread will provide information on the presence of sludge, the depletion of oil additives and/or moisture. The test is a rough estimate of sludge quantity but not of its identity.

c. Moisture Testing. Moisture or free water In an oil causes sludge formation In the crankcase and prevents proper lubrication. Excess water causes flashing of metal surfaces under hot operating conditions, and can cause engine failure. Moisture or free water in a transmission causes sludge formation or corrosion. Heat transfer fluids and dielectric fluids require careful treatment due to their sensitivity to moisture, particulate and ion contamination which can adversely affect equipment operation and degrade the fluid Insulating properties. Water or moisture may be determined by either of the following methods:

(1) Crackle Test. The crackle test is a qualitative test used for screening oil samples for the presence of water contamination. After vigorous shaking, one or two drops of the used oil sample are dropped onto the surface of a laboratory hot plate which has been heated to 150 -177 degrees C (300-350 degrees F). A positive test is indicated by an audible crackling and spattering of the oil. Use of this test in conjunction with other tests can be used to identify probable sources of water contamination.

(2) Karl-Fischer Method. The Karl-Fischer method utilizes an automatic coulometric titrator that determines the quantitive amount of water in various fluids (transmission, heat transfer, dielectric, etc.). This is an electrochemical technique. A measured amount of sample is added to a cell containing a sensing electrode in a chemical medium. If water is present, the sensing electrode causes the cell to generate iodine. When the sensing electrode indicates no water is present, iodine production stops. The electrical charge used to generate the iodine is proportional to the concentration of water. The test functions automatically and provides a readout of the electrical charge used which is converted electronically into an indication of water content of the sample in PPM or in percent by volume/weight.

d. Fuel Dilution (Flash Point). The flash point is a means of determining if used lubricants are contaminated with diesel or gasoline fuel. SETAFLASH testers are used in accordance with American Society for Testing and Materials (ASTM) Method D 3828 and Institute of Petroleum (IP) Method 303. The two models of the SETAFLASH Tester recommended are the Model 03SF HiTemp for diesel fuel contamination and the Model 01SF Low Temp for gasoline fuel contamination. There are two very similar procedures for using the SETAFLASH tester. The "Flash/No Flash" method reports a temperature and whether a flash did or did not occur which represents a simple "Go/No Go" test. The "Finite Flash Point" method reports the actual temperature that the flash point occurs which is an accurate quantitative result. For field application, the "Flash/No Flash" method is preferred, since the "Finite Flash Point" method is too time consuming for routine laboratory use.

e. Insoluble Debris Characterization (Microscopic Analysis). Insoluble debris, collected by filtration on a membrane filter, are examined microscopically to determine their significance with respect to wear and contamination. Some contaminants such as metal chips or dirt may provide Indications of the source of the contaminants. This may be of particular value in the quality control of high performance fluids or in early detection of imminent failures.

f. Particulate Contamination. Measuring particulate contamination provides the quantity and size of particles present. Large particles are generally ingested dirt while smaller particles are usually generated from the system itself in the form of wear debris.

g. Fourier Infrared Transform Spectrometer (FT-IR). The FT-IR spectrometer system quantitatively measures water, fuel, coolant, soot, and by-products in synthetic and petroleum based lubricants. It also monitors component's lubricant additive depletion, lubrication degradation, and incorrect oil contamination for predicting a variety of fluid condition that lead to component failures.

h. Debris/Wear Particle Analysis (Ferrographic analysis). Ferrography is a means of microscopic examination of component wear particles suspended in fluids. The ferrographic analysis of wear particles begins with the magnetic separation of wear debris particles suspended from the lubrication fluids. The primary element evaluated is iron (Fe). There are two basic types of ferrographs to evaluate wear particles : The analytical ferrograph system and the Direct Read (DR) ferrograph. The analytical ferrograph allows visual analysis for wear particles to be identified by type and characteristics of the wear. The DR ferrograph is used to obtain numerical baseline values for normal and abnormal wear.

SECTION III

CUSTOMER RESPONSIBILITIES, REQUIREMENTS, AND PROCEDURES

3-1. Importance of Oil Analysis at Customer Level. The stated purpose of the oil analysis program is to detect changes in the condition of used oil and other fluids, to detect unusual wear and to predict impending equipment failures. At the customer level this can be translated into improved equipment operational safety and reliability and increased maintenance effectiveness through performance of the right maintenance, at the right time at the lowest maintenance level consistent with good maintenance practices. An effective oil analysis program can also enhance maintenance workload planning by early identification of unscheduled maintenance requirements, improve the quality of maintenance and equipment operating practices, and result in improved maintenance procedures and equipment design as a result of oil analysis feedback information. Feedback is an extremely important element of the oil analysis program. Feedback is that information passed between all activities involved in the oil analysis program concerning conditions that may affect or influence either the oil analysis sample evaluation process and/or the resulting recommendation for maintenance action. Feedback may result in engineering change decisions that affect the safety, reliability or maintainability of operating equipment. Feedback from the oil analysis process also provides the basis for improved troubleshooting assistance from the supporting laboratory as data are compiled relating sample results to a particular component that may be generating abnormal wear metals. The refinement of this process on some equipment has resulted in the ability to correct problems by component replacement at the organizational level rather than removal of the equipment for overhaul. Feedback concerning increasing contamination trends on a specific item of equipment has also assisted in improved operational planning, for example, restricting an aircraft from cross country flights to avoid the possibility of an engine change at a remote site, until the problem causing the increasing trend is identified and corrected. Feedback also creates a dynamic evolution of the criteria used to evaluate oil samples. This process ensures that the criteria applied to detected oil condition changes are more accurately related to actual equipment condition, thus reducing the possibility of premature, unwarranted equipment removals from service, while ensuring that criteria levels are low enough to ensure equipment operating safety. Probably the most important element of the feedback system to the customer is the laboratory recommendation for maintenance action following analysis of the customer's oil sample. Oil analysis laboratory recommendations are the result of careful trending and in-depth analysis of equipment history and should normally be followed. However, it is ultimately the customer's responsibility to decide what action to take in regard to any recommendation from the JOAP laboratory. A customer representative must work closely with the supporting oil analysis laboratory to ensure adequate maintenance procedures are implemented which will result in reduced maintenance costs and increased operational and personnel safety. See Appendix A for descriptions of all laboratory recommendation codes.

3-2. Customer's Responsibilities. Customer responsibilities are as follows:

a. Establish a system of internal accounting/record keeping to ensure that all samples for equipment entered in the oil analysis program are taken correctly and on time in accordance with applicable directives, to ensure that all samples are correctly identified, with accompanying paperwork correctly completed, and to ensure that all samples are expeditiously forwarded to the supporting oil analysis laboratory.

b. Ensure that all personnel involved with the oil analysis program are properly trained in their duties and thoroughly aware of the importance of, and the benefits to be obtained by, an effective oil analysis program.

c. Ensure that timely response is made to laboratory requests for samples or laboratory recommendations for maintenance actions and that prompt and complete feedback is provided to the laboratory concerning any condition or maintenance action that may affect the condition of the equipments' oil system. Customer feedback includes any internally generated maintenance action as well as those maintenance actions performed as a result of laboratory analysis reports or recommendations.

d. Designate a unit point of contact to monitor activity compliance with oil analysis requirements and to establish close liaison with the supporting oil analysis laboratory for all matters relating to activity support and equipment condition.

e. In accordance with OPNAVINST 4790.2 Series, U.S. Navy customers (aircraft reporting custodians) operating aircraft are additionally responsible for maintaining records of oil analysis results to highlight equipment trends. Although the laboratory operator/evaluators are responsible for evaluating analysis results and providing recommendations to the customers, the customer has the ultimate responsibility to determine what action, if any, is required in response to a laboratory recommendation. In order to fulfill this responsibility, certain equipment oil analysis and maintenance information must be available to the maintenance manager. The content and format of the oil analysis trend record may vary between activities but the basic information to establish a trend record must be maintained by all aircraft reporting custodians. Figures 3-1 and 3-2 illustrate formats considered adequate for Oil Analysis Trend Forms and may be adapted for use by operating activities. Oil Analysis Trend Records are not available as standard forms and must be produced by individual user activities. Oil Analysis Trend Forms shall be maintained for each item of organizational equipment entered in the oil analysis program. Trend records shall remain on file until the equipment undergoes overhaul/first degree repair, at which time a new base line/trend will be established for the equipment.

3-3. Laboratory Support of Customers. Operational activities will normally be supported by the JOAP laboratory listed in Appendix B closest to their area of operation or capable of providing the most responsive support. Activities experiencing any problems with laboratory support or anticipating changing supporting laboratories due to change of operating site should request guidance via the normal chain of command. Assignment or transfers of customers between laboratories will be coordinated by the Major/Type Command, the laboratory's parent command and the appropriate service oil analysis program management office. Interservice laboratory support workload matters should be coordinated through the appropriate service chain of command directly to the service program management office. Customers desiring to obtain oil analysis support from an oil analysis laboratory not currently approved and qualified within the Joint Oil Analysis Program must submit a request through the chain of command to the appropriate service program manager. The following information will be provided:

Laboratory name/location and affiliation
Type spectrometer
Type standards
Laboratory operator qualifications
Description of support work to be performed
Details of proposed support agreement

Service program managers may approve such laboratories if they qualify for entry in the JOAP Correlation Program in accordance with paragraph 4-3. Laboratories may be approved for interim operational support by the appropriate service program manager(s) following successful completion of analysis of three special sets (six pairs) of correlation samples as specified in paragraph 4-3.e. Laboratories shall then be entered in the JOAP Correlation Program and receive final program manager approval or disapproval based on Correlation Program performance results.

3-4. Sampling Intervals. Sampling intervals have been established for specific equipment based upon engineering design, average wear rates, projected failure points, and the hazards related to potential system/equipment failures. Therefore, equipment sampling should be closely monitored for compliance with established intervals. The sampling interval should not vary more than plus or minus 10 percent of that specified for each Type/Model/Series of equipment except as modified by appropriate equipment managers.

OIL ANALYSIS TREND RECORD

430086 (EQUIP ID) 127723 (END ITEM ID)

MO DAY	TSO TSOC	SAMPLE RANGE/ RESULT (1)	LAB (2) RECOMMENDATION	CUSTOMER ACTION (3)	OTHER OIL SYST MAINT AFFECTING OIL ANALYSIS (4)
2/15	/73	N (NORMAL)			
2/23	/105	M (MARGINAL) IRON OVER TH 7 PPM	DO NOT CHANGE OIL - RESAMPLE IN 5 HRS.	CW	
2/26	/110	H (HIGH) IRON EXCEEDS HIGH LIMITS 15 PPM	DO NOT FLY CHECK MAIN + ACCY OIL PUMPS + GB	CW	CHANGED MAIN OIL PUMP CHANGED OIL SUBMIT SAMPLE AFTER 1 HR GRD RUN
2/28	/01	N	SUBMIT 5 HR SAMPLE	CW	
3/2	/06	N	RESUME NORMAL SAMPLING		
3/17	/37	N			CHANGED OIL - ROUTINE 3-12 30HRS TSOC
4/7	/69	N ABNORMAL INC	SUBMIT 5 HR SAMPLE	CW	
4/9	/74	M IRON INCR OVER THRESHOLD 12 PPM	DO NOT FLY SAMPLE ASAP	CW	
4/10	/75	A ABNORMAL IRON LIMIT EXCEEDED 17 PPM	REPL ENGINE	CW	ENG REMOVED - SENT TO AIMD

(2) Enter message DTG in lab recommendation block for abnormal results reported (optional).
(3) Enter customer response to lab recommendation, e.g., CW -Complied With.
(4) List any other maintenance actions that may affect oil system analysis. Report significant maintenance to supporting lab using DD Form 2026.

Figure 3-1. Oil Analysis Trend Record (Sample Format)

OIL ANALYSIS TREND RECORD

EQUIP ID _____ END ITEM ID _____

SAMPLE TSO/TSOC	FE	AL	AG	CU	MG	TI	NI	CR		LABORATORY RECOMMENDATION	MAINTENANCE DATA/ ACTION TAKEN

(2) In maintenance data column - list action taken in response to lab recommendation and other miscellaneous remarks.

Figure 3-2. Oil Analysis Trend Record (Alternate Sample Format)

NOTE

Samples may be taken earlier than the specified interval if adjustment to engine sampling time is required to permit simultaneous engine sampling on multi-engine aircraft. However, limits may not be exceeded to adjust sampling times.

Refer to the applicable scheduled maintenance or periodic inspection documents for the specific routine sampling interval and specific sampling instructions for each Type/Model/Series equipment being sampled.

3-5. Sampling Procedures. The success and effectiveness of the oil analysis program is dependent upon reliable samples. A reliable sample is one which is truly representative of the circulating fluid in the equipment being evaluated.

a. When to Take Samples. Samples should be taken as soon as possible after engine/equipment shutdown and before any fluid is added to the system. An exception to this requirement is non-aeronautical equipment oil samples. If fluid was not added following shutdown, these samples may be taken without warming a component to operating temperature if the equipment has been operated within the last 30 days. If not operated within the last 30 days, the equipment must be brought to operating temperature before sampling. (Army personnel sampling nonaeronautical equipment should refer to DA Pam 738-750 for additional oil analysis procedural information.) If a sample must be taken from a unit after new oil has been added, e.g., if oil level is too low to permit sampling or if laboratory requests a special sample following oil addition and prior to equipment operation, the old and new oils must be thoroughly mixed to obtain a homogeneous mixture by operating the unit to operating temperatures before taking the sample. In systems where system oil temperature is not an operating characteristic, a judgment of operating time required to obtain a homogeneous mixture must be made based upon system characteristics such as system capacity, pump volume output, reservoir capacity, etc. These procedures are necessary since any sample taken from a system in which the fluid is not a homogeneous mixture will not be representative of actual fluid condition and may distort the laboratory trend for the equipment and may result in a resample request from the laboratory.

(1) Routine Samples. Routine sampling intervals shall be as specified in appropriate service documentation governing operation and maintenance of each Type/Model/Series equipment. Cognizant Weapon System/Model Engineering activities establish and maintain sample interval documentation to provide effective oil analysis coverage.

(2) Special Samples. Special samples from equipment monitored by the service oil analysis programs will be taken in accordance with the following guidelines:

(a) Whenever requested by the laboratory.

(b) Whenever directed by the unit maintenance activity to investigate suspected deficiencies.

(c) Immediately following an operation in which any abnormal condition or incident occurred resulting from either malfunction of the oil lubricated system, or damage to the oil lubricated system from excessive loss of engine oil, or low/fluctuating or zero oil pressure.

(d) Immediately prior to and after maintenance is performed affecting the oil lubricated system, including the removal and replacement of an oil lubricated system component. Systems which are sampled after each flight do not require samples taken prior to maintenance, provided an analysis was accomplished after the last flight. The "after replacement" sample should be taken after ground/functional run-up or check flight.

NOTE

Special sampling is not required for maintenance performed on oil pressure or quantity indicating systems where it is determined that only the instrument system components are faulty and where repair, replacement and/or failure of these components will not cause damage to oil wetted components or cause wear-metal particles, foreign material and/or instrument system fluids to be introduced into the oil system.

(e) After flight test following installation of new, overhauled, or repaired aircraft engines.

(f) At completion of a test cell run. If unit is operated on oil previously used in the test cell system, a sample is required both prior to and at the completion of the test cell run.

(g) Whenever excessive vibration or a chip light indication is experienced on an aircraft engine or component during flight, ground or test run.

(h) Immediately following all aircraft incidents involving failure of internal enclosed lubricated parts or unplanned/unexpected shutdown affecting operation of internal enclosed lubricated parts.

(i) Immediately following all aircraft accidents regardless of cause and resulting damage. These samples will be taken by any means possible to obtain a representative sample.

(j) Prior to overseas deployment or redeployment of any equipment already being monitored by oil analysis. Samples should be taken far enough in advance to assure receipt of analysis prior to unit deployment or redeployment. A sample prior to departure is not required if: (1) the aircraft is on routine sampling; and (2) oil analysis records will accompany the aircraft; and (3) the normal sampling interval can be maintained due to the availability of an oil analysis facility at the destination.

(3) Additional Special Samples. Special samples taken from equipment not enrolled in a service oil analysis program may be submitted to a JOAP Laboratory. No advice is provided for samples that do not have limits provided to JOAP by the cognizant engineering activity.

b. How to Take Samples. There are three basic techniques for taking a sample; dip tube, drain/valve, and pump. Detailed sampling procedures for specific equipment are established in applicable service documentation governing the use and operation of such equipment.

(1) Dip Tube Sampling.

(a) Remove the filler cap/dip stick from the tank and open the sample bottle.

(b) Using a sampling tube of the correct length, grasp the tube at one end and lower it into the tank through the filler neck (see figure 3-3, Views A and B). For units using the new sampling kit with the plastic bottle, insert one end of the dip tube into the opening on the cap of the plastic bottle. Insert the other end into the oil reservoir. Squeeze and release the bottle. After the sample is obtained, remove the tube and close the lid.

WARNING

Do not use mouth suction to fill the sampling tube. Many fluids are highly toxic and may cause paralysis and/or death.

(c) Allow the lower end of the tube to fill with fluid, then close the upper end with a thumb or finger. Withdraw the tube and drain the trapped fluid into the sample bottle (see figure 3-3, Views C and D). Repeat this operation until the bottle has been filled to approximately 1/2 inch from the top.

NOTE

The plastic sampling tubes may be received curved and difficult to straighten; but a tube straightener can be fabricated and used for taking samples from many systems. An example of a tube straightener constructed with 3/32-inch diameter stainless steel rod is illustrated in figure 3-4.

(d) Replace the filler cap on the tank and dispose of the sampling tube in accordance with local base requirements.

CAUTION

If sampling materials are accidentally dropped into the system, do not operate the equipment until corrective action has been completed.

(2) Drain/Valve Sampling.

(a) Check appropriate service documentation for location of drain/valve. Equipment may have to be in operation for valve sampling.

(b) Open the sample bottle.

(c) See figure 3-5 for a locally manufactured drain kit.

(d) Hold the sample bottle under the drain/valve and fill to approximately 1/2 inch from the top as pictured in figure 3-5, views B and C. Close the drain/valve outlet.

(e) Replace the bottle cap and tighten it enough to prevent leakage from the bottle.

(3) Pump/Syringe Sampling.

(a) Determine the best source for obtaining the sample such as the dipstick hole or filler neck.

(b) Determine best length for sample tubing according to the equipment.

(c) Open the sample bottle. (Pumps are designed to attach the sample bottles to the pump assembly.)

(d) Use pump/syringe action to draw fluid from equipment.

(e) Deposit fluid into sampling bottle. Repeat steps (d) and (e) as necessary to fill sample bottle to approximately 1/2 inch from the top.

(f) Replace the filler cap or dipstick and discard the sampling tube. Replace the sample bottle cap and tighten enough to prevent leakage.

(4) Oil Serving Cart Sampling.

(a) Remove supply tank fill cap and visually inspect tank for contamination. If contamination is found, refer to applicable tech orders and conduct an investigation.

(b) With the supply hose connected to the fill cap adapter, operate pump to circulate oil from the tank to the supply hose.

(c) Remove the hose from the fill cap adapter and install the Nozzle Adapter onto supply hose.

(d) Carefully pump a sufficient amount of oil into the sample bottle, filling the bottle to within one-half inch from the top of the bottle.

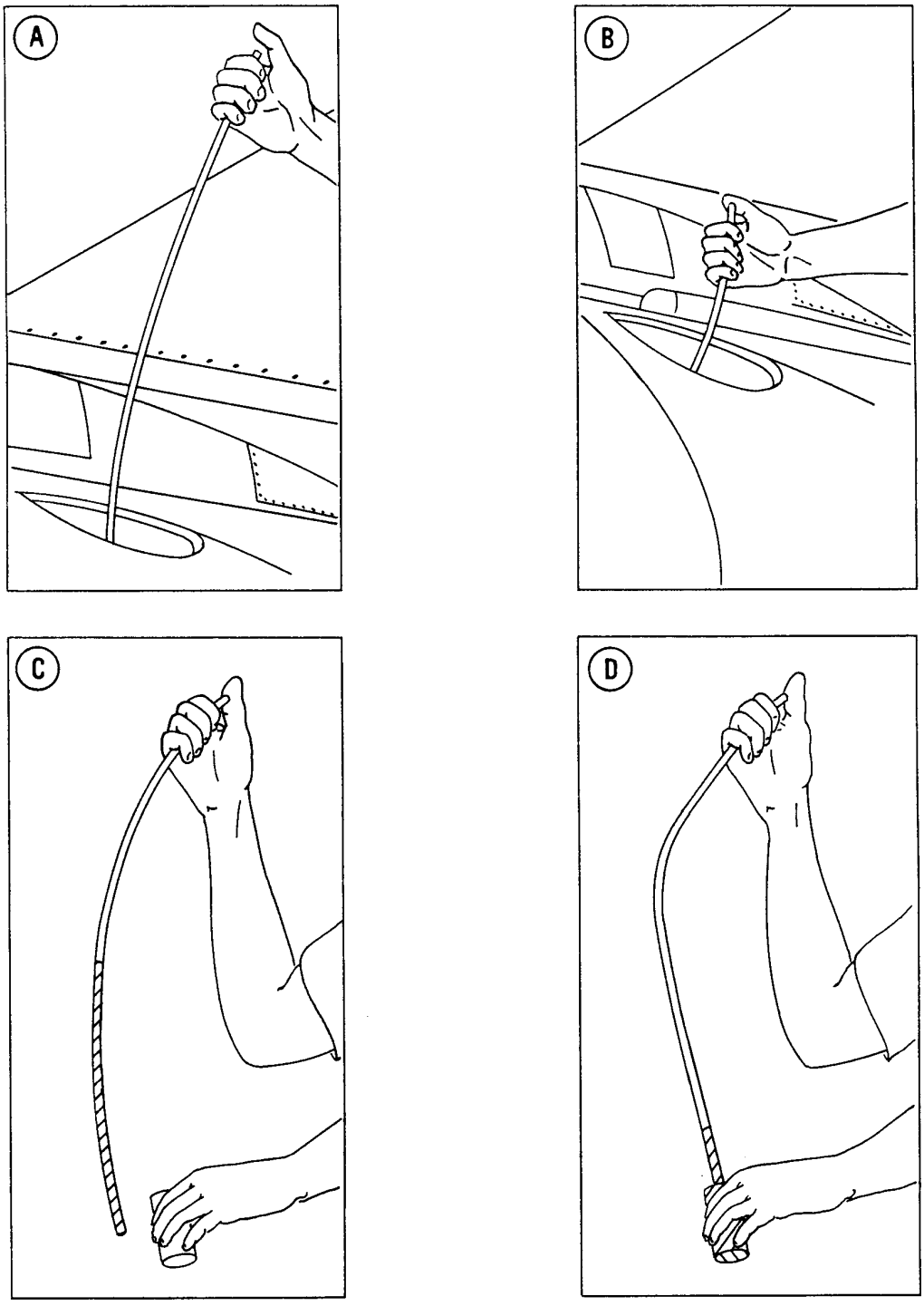

Figure 3-3. Dip Tube Sampling

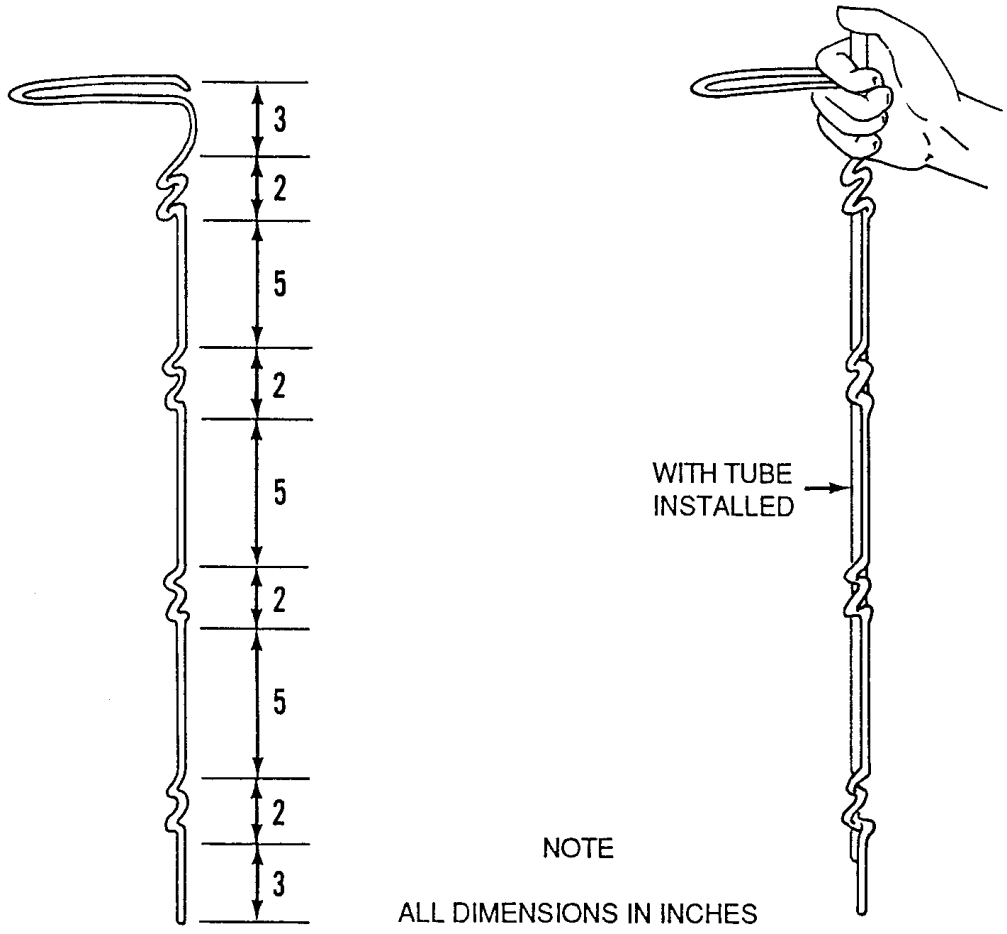

Figure 3-4. Sample Tube Straightener

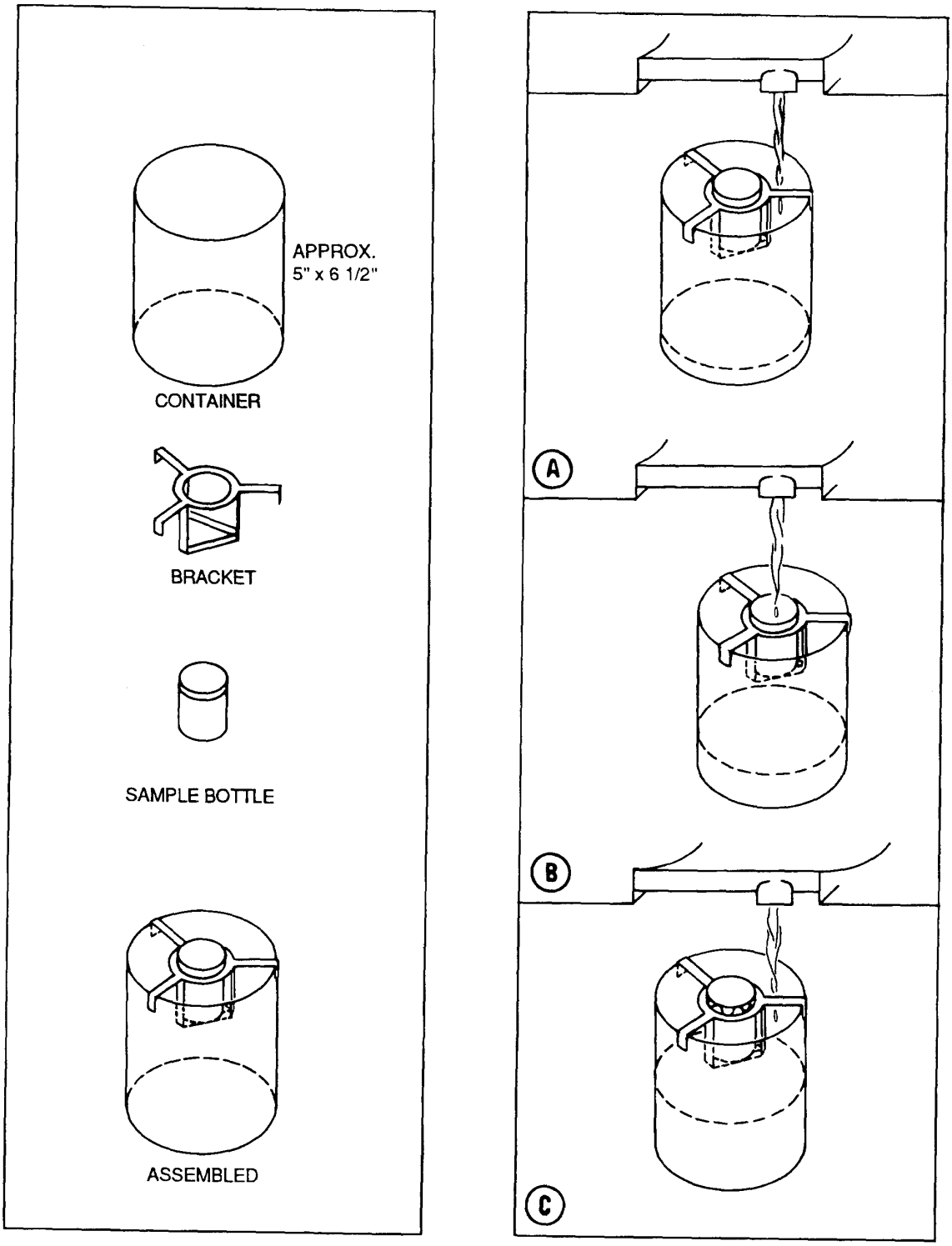

Figure 3-5. Locally Manufactured Drain Sample Kit

c. Special Precautions. The following precautions are provided to assist activities in ensuring reliable equipment fluid samples:

(1) Store unused sampling kits or materials in clean, closed containers, such as the packaging boxes in which received.

(2) Use the correct length of sampling tube for the particular equipment involved so that the tube cannot reach the bottom of the tank and pick up sludge contamination. In cases where the tubing must be cut to the proper length, the tubing should be cleanly cut at a 45-degree angle, exercising care not to leave rough edges that could introduce bits of plastic tubing into the system being sampled.

(3) Avoid contact of the sampling tube with the outside of equipment being sampled and all other surfaces which might contaminate it. Use a sampling tube to take one sample only and discard the tube after taking the sample.

(4) Open the sample bottle only when ready to take the sample and replace the bottle cap immediately after taking the sample.

(5) In cases where samples can be taken only by draining from a valve or the bottom of the tank, sump, or case, open the drain valve/outlet and allow enough fluid to flow through to wash out any accumulated sediment before filling the bottle. If it has been determined that a particular system does not normally have sediment at the point where the sample is drained, it is not necessary to perform the sediment removal procedure.

(6) Use lint-free wiping cloths to avoid introducing lint into the system.

CAUTION

If sampling materials are accidentally dropped into the system, do not operate the equipment until corrective action has been completed.

(7) Exercise caution to avoid dropping sample bottle caps or other material into the system during sampling.

WARNING

Do not use mouth suction to fill the sampling tube. Many fluids are highly toxic and may cause paralysis and/or death.

(8) Exercise care during the sampling process to avoid burns from hot fluid. Do not leave plastic tubing in hot fluid for extended periods since the tubing may melt and contaminate the system.

(9) To reduce the possibility of sample misidentification, all sample bottles/bottle containers should be marked with equipment/system identification as soon as possible after drawing sample.

3-6. DD Form 2026, Oil Analysis Request and DA Form 5991-E, Oil Analysis Request, Unit Level Logistics System (ULLS) (DD Form 5991-E is an automated form applicable to US Army Units only).

a. The Oil Analysis Request Form, DD Form 2026, is used for:

(1) Submission of routine or special oil samples.

(2) Reporting corrective maintenance actions, including engine/component removal, taken as a result of a laboratory recommendation.

(3) Reporting the initial entry (or reentry) of equipment into the oil analysis program with a sample or the removal of equipment from the oil analysis program, with or without a sample.

(4) Reporting removal/replacement of an engine, gearbox or other oil analysis monitored accessory for reason's other than a laboratory recommendation.

(5) Reporting all maintenance actions, such as change of oil or an oil system compo nent, which can affect the presence or level of wear metal in the oil system.

(6) Reporting incidents, such as overspeed, overtemp, compressor stall, or abnormal oil pressure indications, that could adversely affect oil wetted parts subject to wear.

b. Filling out DD Form 2026. Proper completion of the Oil Analysis Request by the submitting activity Is a vital stop in the evaluation process upon which maintenance actions are based. When forms are incomplete or erroneously completed, all other efforts to produce a valid evaluation are degraded or impossible. Examples of DD Form 2026 usage are provided by figures 3 -6 through 3-11. Customers shall use only plain language, unless otherwise directed. If extra space is required, attach additional sheets.

(1) Examples of routine and transit analysis, minor engine maintenance, and engine removal, Side I of DD Form 2026, are provided by figures 3 -6, 3-7, and 3-8. Instructions for DD Form 2026 completion are as follows:

(a) TO: Oil Analysis Laboratory. Enter the de signated OAP laboratory which will perform the sample analysis, e.g., Ft. Campbell, KY; Columbus AFB, MS; NADEP Jacksonville, FL; etc.

(b) FROM:

1. Major Command. Enter possessing Major Command, foreign government or contractors, e.g., TAC, FORSCOM, COMNAVSURFLANT, RAF UK, and General Dynamics.

2. Operating Activity. Enter the designation of the operating activity submitting the sample, e.g., 432BW, 337 Med Co A., VA 165. Air Force enter name of base; Army and Navy enter unit identification code.

(c) Equipment Model/Application. Enter type, model and series of engine being sampled, e.g., J57-21, J85-5, GTCP85-106, AVDS 1790, LM-2500. Accessory equipment being sampled will be identified by nomenclature such as CSD, main gearbox, fwd trans, hyd sys #1, etc.

(d) Equipment Serial No. Enter complete serial number of equipment being sampled.

(e) End Item Model/Hull No. Enter mission, design and series (type, model, series) of end item which contains system being sampled, e.g., F100D, M32A -60, A4A, M-60, DD 963, etc.

(f) End Item Ser No/EIC. Enter the complete end item serial number (bureau number).

(g) Date Sample Taken (Day, Mo, Yr). Enter the date in numerics - day, month and year on which the sample was taken, e.g., 06/12/85 for 6 Dec 1985.

(h) Local Time Sample Taken. Enter local time sample was taken using 24 -hour clock, e.g., 0700, 1600, 2200, etc.

(i) Hours/Miles Since Overhaul. Enter the total hours/miles since overhaul of system being sampled to the nearest whole hour/mile (round up if 0.5 or above). If the equipment has never been overhauled, the total operating hours/miles since new are used. Air Force personnel will normally enter total flying hours. However, on equipment such as the F-100 and F-110 series engine, engine operating hours will be entered except when accuracy and availability of the engine operating hours are not practical.

(j) Hours/Miles Since Oil Change. Enter hours/miles since oil change on system being sampled to the nearest whole hour/mile (round up if 0.5 or above).

NOTE

Accurate data on hours/miles since overhaul and hours/miles since oil change are extremely important for correct evaluation of the analysis results. Every effort possible must be made to ensure that these data are correct.

(k) Reason for Sample. Enter reason for taking sample. Place an "X" in applicable block; if "Other" block is marked, specify reason for sample, e.g., initial sample, warning light, etc.

NOTE

If the sample is a special sample, it must be prominently marked in red (such as red borders), both on the form and on the outside of the mailing container to alert the laboratory to the need for immediate processing.

(l) Oil Added Since Last Sample. Enter the quantity of oil added since the last sample to the nearest whole number and specify the measurement used.

CAUTION

Oil consumption information is essential to the evaluation process for trend analysis and to determine if a system is using excessive amounts of oil. Report suspected excessive oil usage to both the local system manager(s) and the local oil analysis laboratory.

(m) How Taken. Leave blank unless specifically directed otherwise.

(n) Sample Temperature. Leave blank unless specifically directed otherwise.

(o) Type Oil. Leave blank unless specifically directed otherwise.

(p) Engine position : Enter position number when applicable.

NOTE

The customer is responsible for completing all required information above "FOR LABORATORY USE ONLY" and their sample number. Sample numbers are normally assigned by both the customer and the laboratory to ensure that all of the samples taken were successfully processed.

(q) Name: The individual who took the sample will print his/her name.

(r) Employee number (Air Force and Navy only) : The individual who took the sample will enter his/her employee number.

(s) Remarks/Miscellaneous : Enter any pertinent sample information. On initial samples, note any changes in equipment status, and provide the JOAP laboratory with the following information:

1. System oil capacity.
2. Oil change interval.
3. Sampling interval.
4. Minor maintenance actions within the oil system.

OIL ANALYSIS REQUEST

TO: OIL ANALYSIS LABORATORY: JOAP-TSC (TRANSIT)

FROM:
MAJOR COMMAND: NAVAL AIR TRAINING
OPERATING ACTIVITY (Include ZIP Code / APO/DODAAD): VT-86 TRARON EIGHT SIX PENS, FL. 32508

EQUIPMENT MODEL/APPLICATION: J52-P6

EQUIPMENT SERIAL NUMBER: 650116

END ITEM MODEL/HULL NUMBER: TA-4F

END ITEM SERIAL NUMBER/END ITEM CODE: 158725

DATE SAMPLE TAKEN (Day, Mo., Yr.): 02 - 25 - 99

LOCAL TIME SAMPLE TAKEN: 1300

HOURS/MILES SINCE OVERHAUL: 480

HOURS/MILES SINCE OIL CHANGE: 122

REASON FOR SAMPLE

☒ ROUTINE ☐ LAB REQUEST ☐ TEST CELL ☐ OTHER (Specify)

OIL ADDED SINCE LAST SAMPLE (Pts, Qts, Gals): 1 PT

ACTION TAKEN

DISCREPANT ITEM

HOW MALFUNCTIONED

HOW FOUND

☐ LAB REQUEST ☐ AIR OR GROUND CREW

HOW TAKEN ☐ DRAIN ☐ TUBE

SAMPLE TEMPERATURE ☐ HOT ☐ COLD

TYPE OIL

ENGINE POSITION:

NAME: GEORGE SMITH
EMP NO: S-0231

REMARKS/MISC:

PHONE: 2-1642
SIGNATURE: George Smith

FOR LABORATORY USE ONLY

SAMPLE RESPONSE TIME

FE	AG	AL	CR	CU	MG	NA
NI	PB	SI	SN	TI	B	MO
ZN	LAB RECOMMENDATION					

SAMPLE NO.: 2-234

FILE MAINT

DATA SEQ

Figure 3-6. Oil Analysis Request, DD Form 2026 - Routine Sample (Use Transit Only if Applicable)

OIL ANALYSIS REQUEST

TO	OIL ANALYSIS LABORATORY: JOAP-TSC
FROM	MAJOR COMMAND: NAVAL AIR TRAINING
FROM	OPERATING ACTIVITY (Include ZIP Code / APO/DODAAD): VT-86 TRARON EIGHT SIX PENS, FL. 32508
	EQUIPMENT MODEL/APPLICATION: J52-P6
	EQUIPMENT SERIAL NUMBER: 650116
	END ITEM MODEL/HULL NUMBER: TA-4F
	END ITEM SERIAL NUMBER/END ITEM CODE: 158725
	DATE SAMPLE TAKEN (Day, Mo., Yr.): 10-03-99
	LOCAL TIME SAMPLE TAKEN: 0930
	HOURS/MILES SINCE OVERHAUL: 491
	HOURS/MILES SINCE OIL CHANGE: 2
	REASON FOR SAMPLE: ☒ ROUTINE ☐ LAB REQUEST ☐ TEST CELL ☐ OTHER (Specify)
	OIL ADDED SINCE LAST SAMPLE (Pts, Qts, Gals): ROUTINE OIL CHANGE
	ACTION TAKEN:
	DISCREPANT ITEM:
	HOW MALFUNCTIONED:
	HOW FOUND: ☐ LAB REQUEST ☐ AIR OR GROUND CREW
	HOW TAKEN: ☐ DRAIN ☐ TUBE; SAMPLE TEMPERATURE: ☐ HOT ☐ COLD; TYPE OIL:
	ENGINE POSITION: NAME: GEORGE SMITH EMP NO: S-0231
	REMARKS/MISC: SERVICED WITH NEW OIL AT 489 HRS SINCE OVERHAUL PHONE: 2-1642 SIGNATURE: George Smith

FOR LABORATORY USE ONLY

SAMPLE RESPONSE TIME

FE	AG	AL	CR	CU	MG	NA
NI	PB	SI	SN	TI	B	MO
ZN	LAB RECOMMENDATION					
SAMPLE NO. 3-485					FILE MAINT	DATA SEQ

Figure 3-7. Oil Analysis Request, DD Form 2026 - Routing Sample Following Routine/Minor Maintenance (Oil Change)

OIL ANALYSIS REQUEST

TO: OIL ANALYSIS LABORATORY: JOAP-TSC

FROM:
MAJOR COMMAND: NAVAL AIR TRAINING
OPERATING ACTIVITY (Include ZIP Code / APO/DODAAD): VT-86 TRARON EIGHT SIX PENS, FL. 32508

EQUIPMENT MODEL/APPLICATION: J52-P6
EQUIPMENT SERIAL NUMBER: 650116
END ITEM MODEL/HULL NUMBER: TA-4F
END ITEM SERIAL NUMBER/END ITEM CODE: 158725
DATE SAMPLE TAKEN (Day, Mo., Yr.): 10-03-99
LOCAL TIME SAMPLE TAKEN:
HOURS/MILES SINCE OVERHAUL: 498
HOURS/MILES SINCE OIL CHANGE: 9
REASON FOR SAMPLE: ☐ ROUTINE ☐ LAB REQUEST ☐ TEST CELL ☐ OTHER (Specify)
OIL ADDED SINCE LAST SAMPLE (Pts, Qts, Gals):
ACTION TAKEN:
DISCREPANT ITEM:
HOW MALFUNCTIONED:
HOW FOUND: ☐ LAB REQUEST ☐ AIR OR GROUND CREW
HOW TAKEN: ☐ DRAIN ☐ TUBE
SAMPLE TEMPERATURE: ☐ HOT ☐ COLD
TYPE OIL:
ENGINE POSITION:
NAME: STAN CARLSON
EMP NO: C-3862
REMARKS/MISC: REMOVED AND REPLACED ENGINE AS RECOMMENDED BY THE LAB
PHONE: 7-1642
SIGNATURE: Stan Carlson

FOR LABORATORY USE ONLY

SAMPLE RESPONSE TIME:

FE	AG	AL	CR	CU	MG	NA
NI	PB	SI	SN	TI	B	MO
ZN	LAB RECOMMENDATION					

SAMPLE NUMBER (S): | FILE MAINT: | DATA SEQ:

Figure 3-8. Oil Analysis Request, DD Form 2026 - Operating Activity Information Feedback for Engine Removal (Date Engine Removal is Entered in Date Sample Taken Block)

(t) Phone: The individual who took the sample will enter his/her phone number.

(u) Signature: The individual who took the sample will enter his/her signature.

(2) Examples of reporting feedback to JOAP laboratory of air/ground crew recommended maintenance and customer (repair activity) maintenance feedback to monitoring laboratory are provided by figures 3-9 and 3-10. Instructions for DD Form 2026 completion are as follows:

(a) Complete items (a), (b), (c), (d), (e), (f), (g), (l), and (r) as described for routine analysis/ minor engine maintenance in paragraph 3-6.b.(1). (item (g) is the date maintenance feedback is submitted).

(b) Action Taken. Enter corrective maintenance accomplished to remedy a known or suspected discrepancy, e.g., equipment check-no repair required, removed and replaced, etc.

(c) Discrepant Item. Enter nomenclature of major component and subassembly which has malfunctioned, e.g., engine No. 2 bearing, gearbox accessory drive bearing, etc., or system which is examined for discrepancy, e.g., basic engine, CSD, gearbox, etc. Only one major discrepancy will be reported per failure, e.g, an engine which has several discrepancies such as No. 1 bearing failure, No. 2 bearing scored, and loose tabwasher, will be reported as engine No. 1 bearing failure, which in this case is the most severe discrepancy, No. 2 bearing scored and loose tabwasher may be reported as additional discrepancies in Remarks block. When reporting discrepant items use only the proper nomenclature for the item as listed in the illustrated parts breakdown manual (IPB) for the equipment.

(d) How Malfunctioned. Enter description of defect related to item identified in Discrepant Item block, e.g., worn beyond limits, no defects, defects unknown, etc., The suspected cause of the discrepancy may be reflected in Remarks block.

(e) How Found. Enter an -X- in the appropriate block indicating how the necessity for maintenance action was determined. If other, specify.

(3) An example of a transit aircraft oil analysis record (Side 2 of DD Form 2026), is provided by figure 3-11.

(a) When equipment is scheduled for a mission away from the home installation/base, and oil samples will be due during the mission, the customer is responsible for coordinating oil analysis support at the mission site or at intermediate site(s) if applicable (refer to Appendix B for a complete listing of laboratories). The laboratory that usually supports the equipment will provide historical analytical data upon request. It is the customers' responsibility to provide the laboratory that supports the equipment at the mission or intermediate sites(s) with the historical data so they have a record of previous oil analysis results for the equipment prior to the samples they receive. Complete side one of the DD Form 2026 as described in paragraphs 3-6. b. (1) (a) through (r), adding the word "transit" after the name of the home base if the sample is to be processed at any lab other than the home base laboratory. Aircraft on rotational assignment will reflect the name of rotational base and will not be considered transient. Instructions for completion of side 2 are as follows:

1. Enter complete message and mailing address of assigned support OAP laboratory.

2. Enter laboratory telephone number.

3. Enter end item model and serial number.

4. Enter equipment model and serial number.

5. Enter last three analytical OAP results in designated columns.

6. Enter any pertinent remarks.

7. Enter date aircraft departs on transit mission.

8. Supporting laboratory (while unit is in transit status) will complete the remainder of the transit record.

(b) When the customer returns to home base, records of analysis done at intermediate locations must be delivered to the regular supporting laboratory. If the customer departs prior to receipt of the completed transit record, the intermediate laboratory will forward the completed transit record to the regular supporting laboratory.

3-7. Preparation for Delivery.

a. Attach the completed DD Form 2026 to the sample bottle or wrap the completed form around the sample bottle and insert both into the mailing envelope.

NOTE

If the sample is a special sample, it must be prominently marked in red (such as red borders), both on the form and on the outside of the mailing container to alert the laboratory to the need for immediate processing.

b. Forward the sample package to the supporting laboratory by established channels using the most expeditious means. Criticality of the sample should govern the delivery method, i.e., mail, hand delivery, etc. It should be noted that 4-ounce samples require additional packaging either individually or in groups to be forwarded by mail.

3-8. Sampling Supplies.

a. Kit, Spectrometric Oil Analysis (NSN 6695-01-045-9820). This is a general purpose sampling kit required by operating activities taking and submitting samples for spectrometric testing. This spectrometric oil analysis kit should only be used on equipment that requires the siphoning method for obtaining an oil sample. See paragraph 3-8.d. for individual supplies for equipment that requires the drain method of sampling. This kit consists of a 30-inch long 5/16-inch OD plastic tube, a 5-dram glass bottle with plastic screw cap, a shipping bag and one DD Form 2026 (Oil Analysis Request). Nomenclature is Sampling Kit, Spectrometric. Unit of issue: box, containing 144 kits.

b. Kit, Spectrometric and Physical Test (NSN 4920-01-003-0804). This sampling kit is required by Navy operating activities taking and submitting samples for physical tests only or spectrometric tests combined with physical tests. Each kit contains a 4-ounce polyethylene bottle, a shipping bag, a plastic bag, a NOAP sample label and a DD Form 2026. Nomenclature is Sampling Kit, Oil. Unit of issue: each, material for 72 kits.

c. Kit, Mailer (NSN 8125-01-193-3440). For AOAP use, this kit is required by operating activities taking and submitting samples for physical tests only or spectrometric and physical tests. Each kit contains 24 each of 3-ounce plastic bottles, plastic bags and shipping sacks.

d. Individual Supplies.

(1) Bottle, Spectrometric (NSN 8125-01-378-9518). This bottle with cap can be individually ordered for equipment that uses the drain sampling method. This bottle and cap are the same as contained in the Spectrometric Oil Analysis Kit in paragraph 3-8.a. above. This sample bottle is a 5-dram (5/8 ounce) clear, glass bottle. Nomenclature is Bottle, Screw Cap. Unit of issue: gross (144 each). Use of a smaller bottle is authorized if cleanliness standards set for approved JOAP bottles are met and the bottle size permits at least two sample analyses.

(2) Bottle, Spectrometric and Physical Test (NSN 8125-01-082-9697). For AOAP use, this sample bottle is a 3-ounce plastic bottle. Nomenclature is Bottle, Oil Sample. Unit of issue: box (120 each).

(3) Shipping Bag Spectrometric (NSN 8105-00-498-6619). This bag measures 4 inches x 8 inches. Nomenclature is Shipping Bag, Spectrometric. Unit of issue: bundle (500 each).

OIL ANALYSIS REQUEST

TO	OIL ANALYSIS LABORATORY: JOAP-TSC
FROM	MAJOR COMMAND: NAVAL AIR TRAINING
	OPERATING ACTIVITY (Include ZIP Code / APO/DODAAD): VT-86 TRARON EIGHT SIX PENS, FL. 32508
	EQUIPMENT MODEL/APPLICATION: J52-P6
	EQUIPMENT SERIAL NUMBER: 650116
	END ITEM MODEL/HULL NUMBER: TA-4F
	END ITEM SERIAL NUMBER/END ITEM CODE: 158725
	DATE SAMPLE TAKEN (Day, Mo., Yr.): 14-06-96 / LOCAL TIME SAMPLE TAKEN: 1430
	HOURS/MILES SINCE OVERHAUL: 497
	HOURS/MILES SINCE OIL CHANGE: 8
	REASON FOR SAMPLE: ☐ ROUTINE ☐ LAB REQUEST ☐ TEST CELL ☒ OTHER (Specify) ENGINE MAINT.
	OIL ADDED SINCE LAST SAMPLE (Pts, Qts, Gals): 1 QT.
	ACTION TAKEN: REMOVED AND REPLACED
	DISCREPANT ITEM: OIL PUMP
	HOW MALFUNCTIONED: REMOVAL NOT ASSOCIATED WITH OAP
	HOW FOUND: ☐ LAB REQUEST ☒ AIR OR GROUND CREW
	HOW TAKEN: ☐ DRAIN ☐ TUBE / SAMPLE TEMPERATURE: ☐ HOT ☐ COLD / TYPE OIL
	ENGINE POSITION / REMARKS/MISC: LOW OIL PRESSURE - OIL PUMP CHANGE
	NAME: George Smith / PHONE: 2-1642
	EMP NO: 5-0231 / SIGNATURE: George Smith

FOR LABORATORY USE ONLY

SAMPLE RESPONSE TIME

FE	AG	AL	CR	CU	MG	NA
NI	PB	SI	SN	TI	B	MO
ZN	LAB RECOMMENDATION					

DD FORM 2026, MARCH 1999 (EG) — FILE MAINT — DATA SEQ

Figure 3-9. Oil Analysis Request, DD Form 2026 - Maintenance Feedback Special Sample Following Unscheduled Maintenance Not Associated with the OAP

OIL ANALYSIS REQUEST

TO: OIL ANALYSIS LABORATORY: JOAP-TSC

FROM: MAJOR COMMAND: NAVAL AIR TRAINING

OPERATING ACTIVITY (Include ZIP Code / APO / DODAAD): AIMD SHERMAN FIELD NAS PENS, 32508

EQUIPMENT MODEL/APPLICATION: J52-P6

EQUIPMENT SERIAL NUMBER: 650116

END ITEM MODEL/HULL NUMBER: TA-4F

END ITEM SERIAL NUMBER/END ITEM CODE: 158725

DATE SAMPLE TAKEN (Day, Mo., Yr.)

LOCAL TIME SAMPLE TAKEN

HOURS/MILES SINCE OVERHAUL: 493

HOURS/MILES SINCE OIL CHANGE

REASON FOR SAMPLE

☐ ROUTINE ☐ LAB REQUEST ☐ TEST CELL ☐ OTHER (Specify)

OIL ADDED SINCE LAST SAMPLE (Pts, Qts, Gals)

ACTION TAKEN: REMOVED AND REPLACED

DISCREPANT ITEM: NO. 1 BEARING

HOW MALFUNCTIONED: WORN BEYOND LIMITS

HOW FOUND

☒ LAB REQUEST ☐ AIR OR GROUND CREW

HOW TAKEN ☐ DRAIN ☐ TUBE

SAMPLE TEMPERATURE ☐ HOT ☐ COLD

TYPE OIL

ENGINE POSITION:

NAME: JOHN SAMPLES

EMP NO: S-0427

REMARKS/MISC: YOUR TEARDOWN RECOMMENDATION RESULTED IN ABOVE FINDING

PHONE: 2-4167

SIGNATURE: John Samples

FOR LABORATORY USE ONLY

SAMPLE RESPONSE TIME

FE	AG	AL	CR	CU	MG	NA
NI	PB	SI	SN	TI	B	MO
ZN	LAB RECOMMENDATION					

DD FORM 2026, MARCH 1999 (EG) FILE MAINT DATA SEQ

Figure 3-10. Oil Analysis Request, DD Form 2026 - Customer Feedback Information (Intermediate and Depot Level)

TRANSIT AIRCRAFT OIL ANALYSIS RECORD

ASSIGNED OIL ANALYSIS LABORATORY	LABORATORY TELEPHONE NO.	END ITEM MODEL AND SERIAL NO.
JOAP-TSC	(Autovon): 922-3191	A-4 158725
	(Commercial): 850-452-3191	EQUIPMENT MODEL AND SERIAL NO. J52-P6 650116

LAB CODE	DATE	TOTAL TIME SINCE OVERHAUL	TOTAL TIME SINCE OIL CHG	FE	AG	AL	CR	CU	MG	NI	PB	SI	SN	TI	MO	LAB REC
ANH	12-02-99	460	102	14	0	1	0	3	2	0		3				A
ANH	17-02 99	471	113	13	0	1	0	2	1	0		3				A
ANH	25-02 99	480	122	15	0	1	0	3	1	0		2				A

DATE DEPARTED *(Return this form with aircraft)*
26 FEB 99

REMARKS

DD FORM 2026, MARCH 1999

Figure 3-11. Transit Aircraft Oil Analysis Record, DD Form 2026 (Side 2)
Home Station Information and Last Three Analysis Results

(4) Shipping Bag, Spectrometric and Physical Test (NSN 8105-00-290-0340). This bag measures 6 inches x 10 inches. Nomenclature is Sack, Shipping. Unit of issue: box (250 each).

(5) Plastic Tubing. Various diameters and lengths of plastic tubing are available.

Plastic Sample Tubing	NSN	Unit of Issue
15" long x 3/8" OD	4710-00-933-4415	Bag (100 each)
30" long x 3/8" OD	4710-01-087-1629	Bag (100 each)
20" long x 1/4" OD	4710-00-933-4417	Bag (100 each)
1000 long x 1/4" OD	4720-00-964-1433	Roll (1000 feet)
5/16" OD	4710-01-040-4175	Feet

Nomenclature is Tubing, Nonmetallic except for NSN 4710-01-087-1629 which is Tubing, Plastic.

(6) Oil Sampling Pump (NSN 4930-01-119-4030). This pump is used to extract fluid from nonaeronautical equipment and is used with bottle, NSN 8125-01-082-9697. Nomenclature is Pump, Oil Sampling. Unit of issue: each.

(7) DD Form 2026. Obtain locally through publication distribution channels.

3-9. Battle Group Ships/Squadrons NOAP Procedures.

NOTE

Battle Group Ships/Squadrons will utilize Battle Group Lab if available while deployed. The following procedures must be strictly adhered to, ensuring proper sampling/testing/evaluation and reporting of lubricating and hydraulic oil samples.

a. Prior to Deployment.

(1) Deploying Ships/Squadrons

(a) Notify shore based lab(s) (info Battle Group Lab) via message of upcoming deployment and request all histories be transferred to Battle Group Lab.

(b) Provide Battle Group Lab with NOAP point of contact. Request must be initiated at least 2 weeks prior to deployment to ensure delivery of histories prior to deployment.

(2) Shore Based Lab(s)

(a) Transfer histories of deployers to Battle Group Lab utilizing standard procedures listed in NAVAIR 17-15-50.

(b) Message deployers and Battle Group Lab the effective date and means of transfer (i.e. U.S. Mail, hand-deliver, etc).

(3) Battle Group Lab

(a) Message shore based lab(s) and ships/squadrons upon receipt of histories.

(b) Identify lab point of contact, message address, mail address and any particulars about sample transfer, etc.

(c) Ensure spectrometer is operating properly and correlation results meet established criteria.

(d) Ensure adequate PPT supplies are on hand for entire deployment.

b. During Deployment.

(1) Battle Group Lab

(a) Message battle group, NOAP-PM, TYCOM monthly of sample summary (see figure 3-12).

(b) Coordinate transfer of samples from ships/squadrons to lab (recommend Log Helo).

(2) Battle Group Ships/Squadrons

(a) Draw samples using normal periodicity and transfer to battle group lab.

(b) Hydraulic samples can be sent to nearest shore based lab (i.e. NAF Atsugi, AIMD Sigonella, SRF Guam, NSY Pearl Harbor or home port lab).

(c) Ensure shipping procedures are followed as outlined.

1 Sample bottles are completely full.

2 Caps are tight and not leaking.

3 Sample ID is glued/taped to bottle.

4 DD Form 2026 is completed in accordance with this manual to include sample number and signature. The completed form shall be secured to the sample bottle with a rubber band.

5 Package sample to preclude damage that would cause leakage.

6 Mark package "NOAP SAMPLE. ATTN: AMID NOAP LAB"

7 Utilize NOAP Samples kits available through Naval Supply System (this kit includes 72 bottles, 72 labels, pad of DD Form 2026's and 72 padded mailing envelopes.

(3) Shore Based Lab(s)

(a) Continue processing hydraulic samples.

(b) If samples received from battle group ships/squadrons after transfer, process as normal and inform battle group lab via message of the results for manual entry into database. This will ensure analysis continuity.

c. Post Deployment.

(1) Battle Group Lab

(a) Process all samples in-house.

(b) Force tape file dump and mail to NOAP-DAO.

(c) Transfer all histories back to originating lab.

(d) Provide end-of-cruise summary to appropriate type commanders, shore based lab(s), NOAP-PM and DIR JOAP-TSC.

(e) Message all ships/squadrons that histories have been transferred to home port lab and to commence sending samples to their home port lab.

(f) Continue NOAP support of own ship samples.

(2) Battle Groups Ships/Squadrons

(a) Send all samples to home port lab.

(b) Provide NOAP -PM procedure improvement recommendations.

(3) Shore Based Lab(s)

(a) Update database from battle group lab.

(b) Message battle group, ships and squadrons upon receipt - of histories.

(c) Process all samples.

PRE-DEPLOYMENT MESSAGE EXAMPLE

FM USS UNDERWAY
TO ALL SHIPS/SQUADRONS OF THE BATTLE GROUP
INFO COMNAVAIRSYSCOM WASHINGTON DC//411//
NAVOAPROGMGR PENSACOLA FL//3.2//
COMNAVAIR PAC/LANT//N4//
COMNAVSURF PAC/LANT//N4//
NAVSURF PAC/LANT READSUPPGRU
UNCLAS//NO4731//
SUBJ: NAVY OIL ANALYSIS PROGRAM (NOAP)
REF/A/DOC/NAVAIR 17-15-50//
RMKS/1. FULL SERVICE NOAP LAB ESTABLISHED AND OPERATIONAL FOR BATTLE GROUP_____.
2. PROCEDURES OUTLINED REF A. WILL ENSURE TIMELY RESPONSE TO SAMPLES.
3. WEEKLY AND MONTHLY REPORT WILL BE SENT VIA LOG HELO. FAILED SAMPLE RESULTS WILL BE INCLUDED IN OPSUM OR VIA SEPCOR.
4. SUGGESTIONS TO IMPROVE SERVICE ARE WELCOMED.
5. POINT OF CONTACT IS_____.

Figure 3-12. Message Examples (Sheet 1 of 3)

MONTHLY OPSUM

FM USS UNDERWAY
TO ALL SHIPS/SQUADRONS OF THE BATTLE GROUP
INFO COMNAVAIRSYSCOM WASHINTON DC/411//
NAVOAPROGMGR PENSACOLA FL//3.2//
COMNAVAIR PAC/LANT//N4//
COMNAVSURF PAC/LANT//N4//
NAVSURF PAC/LANT READSUPPGRU
UNCLAS//N04731//
SUBJ: BATTLEGROUP NOAP SUMMARY FOR (MONTH/YEAR)_____.
RMKS/1. TOTAL SAMPLES PROCESSED_____, AERONAUTICAL_____.
NON-AERONAUTICAL_____. COOLANOL/PAO_____.

COMMAND	RCVD	PROCESSED	PASSED	FAILED	RMKS

(LIST ALL COMMANDS)

2. POINT OF CONTACT:_____.

Figure 3-12. Message Examples (Sheet 2 of 3)

MESSAGE FOR TRANSFERRING HISTORIES

FM USS UNDERWAY
TO ALL SHIPS/SQUADRONS OF THE BATTLE GROUP
INFO COMNAVAIRSYSCOM WASHINTON DC/411//
NAVOAPROGMGR PENSACOLA FL//3.2//
COMNAVAIR PAC/LANT//N4//
COMNAVSURF PAC/LANT//N4//
NAVSURF PAC/LANT READSUPPGRU
UNCLAS//N04731//
SUBJ: NAVY OIL ANALYSIS PROGRAM (NOAP) BATTLE GROUP HISTORY TRANSFER
RMKS/1. HISTORIES TRANSFERRED TO_____, ON_____
2. SHORE BASED LAB/BATTLE GROUP LAB REPLY VIA MESSAGE WHEN HISTORIES RECEIVED.
3. POINT OF CONTACT _____.

Figure 3-12. Message Examples (Sheet 3 of 3)

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SECTION IV

JOAP PROGRAMS AND REPORTS

4-1. General, This section provides general information concerning JOAP programs and reports.

4-2. Background. The JOAP certification and correlation programs are primary elements of the JOAP quality assurance effort to ensure standardization of operations and quality of oil analysis by the laboratories enrolled in these programs. Participation in these programs by both organic and contracted laboratories is mandatory for all laboratories equipped with atomic emission rotrode spectrometers.

4-3. JOAP Certification Program,

a. Purpose. To ensure that all participating laboratories meet specified criteria in order to maintain quality and uniformity of spectrometric oil analysis between laboratories.

b. Policy.

(1) All DOD oil analysis laboratories (organic or under contract to a DOD agency or US military service for the purpose of analyzing samples from US government equipment or supplies) will participate in the JOAP Correlation Program. Laboratories with approved types of atomic emission rotrode spectrometers are certified by the Director, JOAP-TSC. Only certified laboratories may perform interservice oil analysis functions. Uncertified laboratories may perform intraservice or intraagency analysis functions only with the service Program Manager's written authorization.

(2) The JOAP Certification Program is currently standardized on the atomic emission rotrode spectrometer. Atomic absorption spectrophotometers do not meet the certification criteria, and therefore will not be certified for interservice oil analysis. Atomic absorption laboratories may be approved for independent operations by program managers for individual service oil analysis.

c. Certification Procedures.

(1) The JOAP-TSC certifies laboratories upon their initial establishment and relocation based on the Service Program Manager's attestation (see figure 4-1) that the laboratory/spectrometer meets specified criteria and the laboratory/spectrometer's satisfactory participation in the JOAP Correlation Program. The certification checklist enables the JOAP-TSC to ensure that laboratories meet minimum criteria required for an operating laboratory.

NOTE

An officer, senior non-commissioned officer*, or senior civilian manager who is responsible for laboratory operations must sign the certification checklist. For contractor operated laboratories, an Officer-in-charge is considered to be the lowest level of government supervision within the laboratory's chain of command authorized to sign correspondence leaving the installation. *Not applicable to AOAP laboratories.

d. Categories of Certification. Based upon qualifications and performance, the JOAP-TSC places eligible laboratories/spectrometers in the following certification categories:

(1) Certified - Correlation average for 3 months is 80 percent or above and all certification checklist requirements satisfied.

(2) Uncertified - Correlation average for 3 months falls below 80 percent and/or certification checklist requirement(s) not satisfied.

JOINT OIL ANALYSIS PROGRAM LABORATORY FACILITY

☐ Army ☐ Navy ☐ Air Force ☐ Other

OFFICIAL MAILING ADDRESS

Parent Command

Lab Activity

Com. Tel. No. | DSN No.

Form Use

☐ CERTIFICATION VERIFICATION CHECKLIST (Orignal to JOAP-TSC, Copy to Program Manager)

☐ PROGRAM MANAGER'S ATTESTATION (Orignal to Program Manager, Copy to JOAP-TSC)

SPECTROMETRIC OIL ANALYSIS INSTRUMENT

Manufacturer and Type (AA, AE, or Other)

Model Number	Serial Number	Date Placed in Service	Type Data ☐ Automated ☐ Manual

Instrument Capability (Circle Elements)

Fe Ag Al B Cu Na Pb Ni Si Sn Ti Cr Mg Mo Zn Other (List)

WORK AREA AND STRUCTURE

Type (Frame, Masonry, Ship, etc.)	Work Area (Sq. Ft.)	Storage Area (Sq. Ft.)

Environmental Controls (Describe)	Comments

WORKLOAD

Samples Per Month	Spectrometric Only	Physicals Only	Spectrometric and Physicals

LABORATORY STAFFING AND MANHOURS

NAME (Last, First MI)	Grade/(MOS/NEC/AFSC)	Training School	Training or	Training OJT	Months of Lab Experience
		☐		☐	
		☐		☐	
		☐		☐	
		☐		☐	
		☐		☐	

Total Manhours Available for Oil Analysis

Comments

Prepared By	Date
Approved By	Date
Program Manager	Date

Figure 4-1. Certification Verification Checklist or Program Manager's Attestation

(3) If a laboratory/spectrometer certification is withdrawn, the laboratory/spectrometer is not approved for interservice work. However, the responsible Service Program Manager may elect to operate the laboratory/spectrometer to satisfy parent service requirements. In order to provide interservice support, the requesting Service Program Manager must authorize the utilization of the laboratory/spectrometer in writing to the laboratory and the JOAP -TSC.

NOTE

Under special conditions, certain checklist elements may be waived by the Service Program Manager or the Director, JOAP -TSC, in order to avoid interruption of essential laboratory operations.

e. Laboratory/Spectrometer Cert ification Procedure. A laboratory must complete the following steps to become certified:

(1) Complete three special certification sample sets (six pairs) with an average of 80 percent or above.

(2) Forward an approved verification checklist to the JOAP -TSC.

(3) Forward the Program Manager attestation to the Service Program Manager and a copy to the JOAP-TSC.

f. Existing Laboratory Procedure.

(1) Certified. Laboratory/spectrometer certification does not expire unless it is uncertified by an action listed in paragraph 4 -3f(2) below.

(2) Uncertified. Reasons for reduction to uncertified are as follows:

(a) Three month average falls below 80 percent.

(b) Failure to submit monthly correlation results prior to the next month's due date.

NOTE

Units with spectrometers in Reported Maintenance (RM) status will comply with procedures in paragraph 4 -4. Units with deployed spectrometers will comply with procedures in paragraph 4 -5.

(c) Failure to submit an annual approved verification checklist.

(d) Failure to meet full operating requirements (dependent upon nature of deficiency).

(e) Laboratory/spectrometer is physically relocated.

NOTE

Spectrometers that are geographically relocated (other than spectrometers that are relocated within the same operating base or vessel) shall be decertified and required to undergo the complete certification procedure as listed for new laboratories. Spectrometers that are physically relocated within the same operating base or vessel will be required to submit anew certification verification checklist and to perform a complete spectrometer standardization prior to commencing normal operational support. Any spectrometer which has to be disassembled in any manner in order for it to be relocated must undergo the complete certification procedure. Mobile emission spectrometers (Baird MOA's, Spectroil M's, etc.) will use the deployment kit available from the JOAP -TSC to ensure proper operation after movement of the spectrometer.

(f) Laboratory is deactivated.

(g) Upon direction of the Service Program Manager and/or the Director, JOAP-TSC.

g. Reinstatement To Certified. A laboratory/spectrometer that has been placed in the uncertified category must complete the certification program as outlined in paragraph 4-3e.

4-4. Laboratories with Equipment in Reported Maintenance "RM" Status.

a. Laboratories reporting RM status for a spectrometer will receive no calculated correlation score for that spectrometer if the RM period extends past the correlation sample analysis due date. During RM periods, spectrometers will be placed in an RM status, and will not be authorized to perform any operational oil analysis support functions.

b. Correlation score average will be frozen at pre-RM period recorded averages for the duration of the RM period.

c. Spectrometers in R/M status for one or more elements channels but not reporting total equipment failure will not be subject to the criteria listed above. Due to inherent differences in operating requirements, different weights placed on different elements, and the type of equipment being monitored, spectrometers will be placed in a status as determined by the appropriate program manager.

(1) R/M status for one to two months - When the spectrometer has been repaired, up to two months of correlation samples that were on hold may be analyzed. If only one set of samples are overdue, analyze the correlation samples on hand immediately after repair. If two sets of samples are overdue, analyze one set on the first workday after repair, and the second set on the second workday after repair. This procedure is to ensure that a different standardization is accomplished for each set.

Example 1 - one month R/M: You report that your spectrometer is R/M on 17 October. On 4 November, it is fixed. Then you analyze the October samples and submit the data to the JOAP-TSC. The November samples are due in by 21 November.

Example 2 - two months R/M: You report that your spectrometer is R/M on 17 October. On 5 December, it is fixed. Then you analyze the October samples and submit data to the JOAP-TSC. After obtaining the October score, you analyze the November samples on the next workday and submit data to the JOAPTSC. After obtaining the November score, the December samples are due in by 21 December."

(2) RM status for three months - Spectrometers will be decertified when the third correlation due date is missed. When the laboratory reports the spectrometer repaired, the laboratory will complete the certification program as outlined in paragraph 4-3e.

4-5. Deployed Spectrometers.

a. Deployable laboratory spectrometers must be approved for deployed operation through a special test procedure. Procedures outlined below must be performed when an organization deploys with a portable atomic emission rotrode instrument prior to supporting actual deployed operations. The test procedure is designed to quickly determine if the spectrometer has survived the transportation to the new site/original site, has adjusted to the environment, and is ready to provide accurate support for the sampling requirements.

NOTE

If the spectrometer is deployed during an exercise and transported from the regular lab location, but will not be used for actual oil analysis support, the special test procedure is not required.

b. After the spectrometer has returned from the deployment, laboratory personnel must ensure that the spectrometer is again fully operational. If the spectrometer will be immediately re-deployed, or immediately used to support local oil analysis requirements, another kit must be successfully analyzed. However, if time permits prior to re-deployment or use within the laboratory, standardization, standardization checks, and participation in the JOAP Correlation Program will ensure that the spectrometer is fully operational.

c. Deployment kits are supplied to all laboratories by the JOAP-TSC upon request for projected deployments. Each kit includes complete instructions, two synthetic oil correlation samples, results sheets which include pass/fail criteria, an envelope for mailing, and message format examples.

d. Two test are required. Test 1 is the analysis of two JOAP Correlation Program synthetic oil samples. Each sample is analyzed three times and averaged. The average value obtained for each of the required fifteen elements is compared to upper and lower limit values that are supplied with the kit. Test 2 involves ten analysis of D12-100 and D3-100 JOAP Calibration Standards that are not supplied with the kit, but are required for standardization of the instrument and must accompany the spectrometer when it is deployed/re-deployed. The test monitor must be an officer, senior NCO, or senior civilian manager with overall responsibility for laboratory management. The monitor must attest that the spectrometer passes or fails the overall testing based on criteria supplied with each kit. An overall average of 80 percent is required.

e. Test results must be reported by message, e-mail, or mail to the JOAP-TSC, applicable command, and the Air Force Oil Analysis Program Office. No approval from any outside agency is required if the results meet the criteria that is supplied with each kit. The spectrometer is approved for deployed site use immediately after the successful completion of the kit. Regular monthly JOAP Correlation samples must still be processed at the deployed location. If the correlation samples must be mailed to the deployed location, contact the JOAP-TSC with new address information. If the deployed spectrometer fails the overall test requirements, contact the applicable service program management office for further instructions.

4-6. Other Laboratories Requiring Recertification.

a. For laboratories requiring recertification, the officer-in-charge/senior civilian manager must verify in writing, using a JOAP-TSC supplied checklist, shown in figure 4-1, that the laboratory meets all operating requirements listed below. An operating waiver may be granted for certain operating requirements by the JOAP-TSC or the appropriate Service Program Manager depending upon the nature and severity of the operating deficiency.

b. Operating requirements are as follows:

(1) Space requirement (as determined by program manager).

(2) Environmental control of equipment spaces.

(3) Staffing adequate for projected workload (as determined by program manager).

(4) Necessary operating supplies available.

(5) Required instrument and support equipment available.

(6) Full time qualified operator/evaluator assigned and present (Army evaluators must be certified, see Volume II, Appendix N).

4-7. Qualifications Required for Operators and Evaluators.

a. Qualifications Required for Operators and Evaluators for each branch of service are as follows: are in

(1) Air Force.

(a) Complete either Block 9 of the Air Force Nondestructive Inspection Course (J3ABP2A732-000) training school, or complete the DOD Operator/Evaluator Training Course (J3AZP2A752-000), and

(b) Perform 30 days on-the-job training in a JOAP certified laboratory, and

(c) Achieve five (5) additional months of operator/evaluator experience.

(2) Navy: Complete the DOD Operator/Evaluator Training Course that includes both spectrometric and physical property analysis (J3AZP2A752-003) resulting in the award of NEC 6403 for active duty personnel and appropriate certificate of completion for civilian personnel.

(3) Army: Meet all of the requirements of Volume II, Appendix, N.

b. In the case of some operators and evaluators, it may not be possible or appropriate to satisfy all of the above requirements. These requirements may be waved on an individual basis by the responsible Service Program Manager.

c. The qualified operator and evaluator must be assigned to the laboratory to qualify the laboratory for JOAP certification and must be present for duty in the laboratory during all hours of laboratory operation. A supervisor, present on an intermittent basis, does not satisfy the operator/evaluator requirements.

4-8. JOAP Correlation Program.

a. Purpose. To ensure uniform and continuous high quality oil analysis results throughout the Joint Oil Analysis Program. The Correlation Program quickly identifies laboratories experiencing instrument and/or operator problems and provides managers and laboratory personnel a means to compare their performance with other laboratories having the same type of spectrometer.

b. Policy. AII DOD oil analysis laboratories (organic or under contract to a DOD agency or US military service for the purpose of analyzing samples from US government equipment or supplies) will participate in the JOAP Correlation Program. Participation waiver may be granted by the applicable program manager for extenuating circumstances. The JOAP Correlation Program is also extended to the following categories of laboratories:

(1) Privately owned laboratories with oil analysis contracts with elements of the DOD.

(a) If the contract does not specify that the DOD will provide participation free of charge in the JOAP Correlation Program, the privately owned laboratory must pay an annual fee to participate in the program.

(b) Contact the JOAP-TSC for current fees and processing instructions. Cash or negotiable instruments cannot be accepted by the JOAP-TSC. Payment must be made through the local contracting office or the major command approving the contract. See Section 1, paragraph 1-5.b for JOAP-TSC address and telephone information.

(2) Federal Government owned laboratories other than DOD laboratories.

(3) Laboratories of an allied nation providing support to the military forces of that nation or to US military forces.

NOTE

Foreign or private laboratories under contract to provide oil analysis services to US military forces and desiring entry into the JOAP Correlation Program should submit letter requests to the appropriate JOAP Management Office via the service contracting office administering the contract.

Laboratories of an allied nation providing oil analysis support to the military forces of that nation and desiring entry in the JOAP Correlation Program should apply through the appropriate FMS case, or in the absence of an FMS case, submit letter requests to the nearest United States Military Advisory Group for consideration and/or processing.

c. Correlation Procedures. The Correlation Program for spectrometers is conducted monthly by the JOAP-TSC. Two sample pairs are mailed from the JOAP-TSC to each participating JOAP laboratory scheduled to arrive not later than the 5th working day of the month. The spectrometer is standardized and the sample pairs are analyzed by the same qualified operator. Results are submitted to the JOAP-TSC to arrive not later than the 21st of each month. Results may be submitted either by mail, FAX, or by message using the message format contained in Volume II. On the 25th of each month or the Monday immediately following the 25th, the JOAP-TSC computes the mean of all spectrometer results for each sample for all required elements for the two categories of spectrometers (JOAP Rotrode and other). Using standard statistical techniques, acceptable reproducibility 1 and reproducibility 2 criteria are calculated. These acceptable criteria are compared to each laboratory's results and points are assigned. From these points, an overall score is assigned for each spectrometer. These scores are used, in addition to facility and personnel requirements, to classify laboratories as JOAP certified or uncertified. Laboratories with spectrometers in R/M status will report this status to the JOAP-TSC prior to 21st of the month. Correlation samples will be retained and analyzed when the spectrometer is repaired. Contact the JOAP-TSC for special instructions when the R/M period exceeds two correlation-reporting periods. A message request for maintenance help to the JOAP-TSC or some other agency with info copy to the TSC does not constitute requesting R/M status unless a specific request for R/M status is included in the message. Either call the TSC or send a message specifically requesting R/M status and try to provide the TSC with a "get well" date.

4-9. JOAP Training.

a. Training Courses Available.

(1) Spectrometer operator/evaluator training courses available at NAS Pensacola, FL:
Website: http://www.cnet.navy.mil/cnet/nattc/361trs/ndi.htm

Title	Course No.
Defense Joint Oil Analysis Program (DoD JOAP) Atomic Emission Spectrometer.	J3AZP2A752-000
Defense Joint Oil Analysis Program (DoD JOAP) Atomic Emission Spectrometer/Physical Properties Testing	J3AZP2A752-003

NOTE

The Air Force Non-Destructive Inspection (NDI) course, J3ABP2A732-000 (or equivalent), includes evaluator training and operation/maintenance of the A/E35U-3 (FAS-2) spectrometer equivalent to training provided in course J3AZP2A752-000.

(2) Spectrometer maintenance training available at Keesler AFB, MS for technicians who support oil analysis laboratories with an A/E35U-3 and Spectroil M spectrometers:

Title	Course No.	Duration
Fluid Analysis Spectrometer Maintenance/Calibration	E3AZR2P051-049	20 class days

b. Training Requests.

(1) Army/Air Force-submit training requirement(s) in accordance with established service procedures.

(2) Navy-submit training requirement(s) through appropriate command channels to the Chief of Naval Education and Training:

Chief Of Naval Education And Training
Code NATPMSA N845
250 Dallas Street
Pensacola, FL 32508-5220
DSN: 922-3684
COMM: (850) 452-3684

4-10. JOAP - TSC Reports.

a. Correlation Program Report. The Correlation Report is published each month by the JOAP-TSC. This report contains the complete correlation results for the most recent month as well as a table showing reproducibility 1 and reproducibility 2 failures and score over the last 12 months for each enrolled spectrometer. This report averages over 400 pages and is intended for JOAP management level use (i.e. JOAP Coordinating Group, Major Command Monitors).

b. Correlation Test Results. The JOAP-TSC sends each participating laboratory their individual correlation test results each month. This computer printout is simply the page of the JOAP Laboratory Correlation Program Report which applies to each individual laboratory. See figure 4-2 for an example of a typical JOAP Atomic Emission Rotrode instrument report and figure 4-3 for a typical Non-JOAP instrument report.

c. JOAP Directory. The JOAP Directory is published by the JOAP-TSC and contains mailing addresses, message addresses and phone numbers of management, liaison offices and oil analysis laboratories. The directory also provides a listing of JOAP codes and backup laboratory data.

d. JOAP Newsletter. The JOAP-TSC publishes a JOAP Newsletter on a quarterly basis. The newsletter is sent to all JOAP managers and DOD connected oil analysis laboratories. Articles published in the newsletter keep managers and technicians informed concerning news and developments relating to oil analysis. OAP personnel are invited to submit articles of interest for publication.

4-11. JOAP Data Processing and Warehousing.

a. The US Army data is processed and warehoused by the US Army Program Management office at Redstone Arsenal, Huntsville, AL. The US Navy data is processed and warehoused by the US Navy Program Management office at Pensacola NAS, Pensacola, FL. The US Air Force data is processed and warehoused by the JOAP-TSC at Pensacola NAS, Pensacola, FL.

b. Laboratories shall submit data to their respective service data base as directed by the service program manager or as contained in this publication.

c. Each service program manager is responsible for routine data transfer to the other services. See Appendix D, OASIS Data Base Structure Summary.

Army only: The AOAP Program Director (PD) will provide technical assistance and initiate corrective software program changes to the Oil Analysis Standard Interservice System (OASIS) laboratory operating system. If OASIS software support is required, contact the PD AOAP as follows:

COMMANDER
ATTN AMXLS LA BLDG 3627
USAMC FIELD SUPPORT ACTIVITY PROVISIONAL
REDSTONE AL 35898-7466
AOAP Hot Line DSN: 645-0869 / (256) 955-0869
Data Facsimile: 746-9344 / (256) 876-9344
DDN address: aoap@logsa.army.mil

d. Data Reports: Routine reports are produced from laboratories and from the service data bases. Examples of some of the reports available are included in appendices C and D (D is Army only).

e. The US Air Force laboratories will use the following instructions for submitting data when using Windows 95. If using any other system software, contact the JOAP-TSC for instructions.

(1) After the diskette with the "keypunch.dat" DOS file is created, start Windows. Any questions about creating this file using AETC software should be referred to the US Air Force Program Office.

(2) There are three ways to send the data. A file may be attached, "Notepad" may be used to import the information directly into the e-mail, or the information may be mailed on diskette if there is no e-mail capability.

(3) Using an attached file:

(a) Go to the e-mail function.

(b) Select "New Message"

(c) Ensure that correct JOAP-TSC address is used for submission of all data bank information: joap-tsc@navtap.navy.mil

(d) Ensure the correct subject is used exactly as shown with no additional characters (use capital letters and spaces as shown):

AETC ATTN JCL

(e) Click on the function to attach a file (represented as a paper clip).

(f) Type in the exact file name or find the file and click on it.

(g) Click on "attach".

(h) Select "Send".

(4) Using "Notepad":

(a) Start up "Notepad" as follows:

(1) Click on "Start".

(2) Go to "Programs".

(3) Go to "Accessories".

(4) Select "Notepad".

(b) From the "Notepad" menu, click on "File", and select "Open".

(c) Select the location of the data at "Look in", which is normally on diskette at the "A" or "B" drive locations.

(d) Select the file desired. If the desired file is not displayed, select "All files" for "Files of type".

(e) Double click on the data file open it.

(f) Click on "Edit" and "Select All". Then click "Edit" and select "Copy". All of the data is now in memory.

(g) Close "Notepad".

(h) Go to the e-mail function.

(i) Ensure that the e-mail is set to a width of 90 characters.

(j) Select "New Message".

(k) Ensure that the correct JOAP-TSC address is used for submission of all data bank information:

joap-tsc@navtap.navy.mil

(l) Ensure the correct subject is used exactly as shown with no additional characters (use capital letters and spaces as shown):

AETC ATTN JCL

(m) Click in the upper left-hand corner of the e-mail message area.

(n) Select "Edit" and then "Paste". This process will place all of the B003 information into the e-mail. Do not enter any additional information into the body of the e-mail. The laboratory location will be known from the coding in the data and the e-mail address.

(o) Select "Send".

(5) If e-mail is unavailable, mail the data diskette to:

JOAP TSC
AETC ATTN JCL
85 MILLINGTON AVENUE
PENSACOLA FL 32502-5020

Inter-Laboratory Correlation Test Results
April 1996
Air Force Laboratory
Baird A/E35U-3 (E)
Sample Pair 1 & 2

Sample 1

	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn
Mean	7.0	26.4	7.9	7.7	7.4	7.2	66.2	7.2	7.0	6.5	7.1	23.9	6.1	6.8	6.5
Lab Results	7	26	7	7	7	8	67	7	7	6	7	23	6	6	7

Sample 2

	Fe	Ag	Al	Cr	CU	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zi
Mean	6.0	22.7	6.7	6.5	6.3	6.2	56.8	6.1	6.0	5.5	6.2	20.5	5.2	6.0	5.7
Lab Results	6	21	6	6	6	6	59	6	6	5	6	18	5	5	6
Reprod.(1)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Reprod.(2)	P	P	P	P	P	P	P	P	P	P	P	F	P	P	P
Points:	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1

Sample 3 Sample Pair 3 & 4

	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn
Mean	10.5	12.3	8.2	19.0	11.2	11.6	58.7	25.4	9.8	10.0	18.4	11.5	10.5	13.2	14.5
Lab Results	11	11	7	19	11	12	65	25	10	10	18	11	10	11	15

Sample 4

	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn
Mean	10.4	12.2	8.1	18.9	11.2	11.5	58.5	25.2	9.8	10.0	18.3	11.4	10.4	13.0	14.2
Lab Results	11	11	7	19	11	12	64	26	10	9	18	11	10	11	15
Reprod.(1)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Reprod.(2)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Points:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Note Failed Critical Wear Element(s): Ti

Twelve Month Summary

	Sample Pair 1 & 2															Sample Pair 3 & 4														Score	3 Mo. Ave.	Cert.
	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn			
																															97	94.7	Y
Apr								2																									
Mar		2														2															93	90	
Feb			1																				1								94L	90.7	
Jan		2		2												2	2						2								83	92.7	
Dec																	1										1				95	97.0	
Nov																															100	97.3	
Oct																											1	1			96	97.3	
Sep								1															2								96	98.7	
Aug																															100	100.0	
Jul																															100	99.3	
Jun																															100	96.3	
May																						2									98	94.0	

1=Failed Reprod.(1) - Reproducibility among laboratories (Inter-Lab)
2= Failed Reprod.(2) - Reproducibility among samples 1 & 2 or 3 & 4 (Intra-Lab)
3=Failed both Reprod.(1) & Reprod.(2) (Inter-Lab & Intra-Lab)

m = Reported Maintenance
s = Not submitted
* No History Found

n = Not Required
z = Given zero
c = Not Computed

Y = Certified
N = Uncertified
A = Allied
- = Non-Certifiable
U = Unknown

Figure 4-2. Typical JOAP Atomic Emission Rotrode Instrument Report

Inter-Laboratory Correlation Test Results
April 1996
Allied Laboratory
Spectraspan (A)
Sample Pair 1 & 2

Sample 1

	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn
Mean	5.7	21.6	5.7	5.9	5.4	5.8		5.7		5.9		18.9			
Lab Results	6	15	5	6	5	6	NR	6	NR	5	NR	18	NR	NR	NR

Sample 2

	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zi
Mean	4.9	18.4	5.4	5.2	4.8	5.2		4.8		5.2		16.0			
Lab Results	5	13	4	5	4	5	NR	5	NR	4	NR	15	NR	NR	NR
Reprod.(1)	P	P	P	P	P	P	-	P	-	P	-	P	-	-	-
Reprod.(2)	P	P	P	P	P	P	-	P	-	P	-	P	-	-	-
Points:	1	1	1	1	1	1	-	1	-	1	-	1	-	-	-

Sample 3 — Sample Pair 3 & 4

	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn
Mean	4.5	5.2	5.4	13.1	5.5	5.1		14.8		6.1		6.0			
Lab Results	5	4	5	12	5	5	NR	14	NR	5	NR	5	NR	NR	NR

Sample 4

	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn
Mean	4.4	4.9	5.5	12.9	5.4	5.2		14.5		5.3		5.8			
Lab Results	5	4	5	12	5	5	NR	14	NR	5	NR	5	NR	NR	NR
Reprod.(1)	P	P	P	P	P	P	-	P	-	P	-	P	-	-	-
Reprod.(2)	P	P	P	P	P	P	-	P	-	P	-	P	-	-	-
Points:	1	1	1	1	1	1	-	1	-	1	-	1	-	-	-

AA Statistics Based On 19 Instruments Reporting

Twelve Month Summary

	Sample Pair 1 & 2														Sample Pair 3 & 4..														Score	3 Mo. Ave.	Cert.
	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn	Fe	Ag	Al	Cr	Cu	Mg	Na	Ni	Pb	Si	Sn	Ti	B	Mo	Zn			
Apr																							1								94	90.7	A
Mar																1		1													89	87.0	
Feb		1		1																											89	88.7	
Jan	1		2																			1									83	88.7	
Dec							1																								94	87.0	
Nov																1									1						89	87.0	
Oct				1												1		1	1												78	90.7	
Sep		1																													94	94.3	
Aug																															100	96.3	
Jul											1							1													89	92.7	
Jun																															100	92.7	
May																1		2													89	89.0	

1=Failed Reprod.(1) - Reproducibility among laboratories (Inter-Lab)
2= Failed Reprod.(2) - Reproducibility among samples 1 & 2 or 3 & 4 (Intra-Lab)
3=Failed both Reprod.(1) & Reprod.(2) (Inter-Lab & Intra-Lab)

m = Reported Maintenance
s = Not submitted
* No History Found

n = Not Required
z = Given zero
c = Not Computed

Y = Certified
N = Uncertified
A = Allied
- = Non-Certifiable
U = Unknown

Figure 4-3. Typical Non-JOAP Instrument Report

APPENDIX A - RECOMMENDATIONS

STANDARD LAB RECOMMENDATION CODES - AERONAUTICAL FOR SPECTROMETRIC ANALYSIS

CODE	GENERAL LAB RECOMMENDATIONS
A	Sample results normal; continue routine sampling.
X	Analysis results supplied to customer; no recommendation required.
Z	Previous recommendation still applies.

CODE	INSPECTION RECOMMENDATIONS (Requires Feedback)
H**	Inspect unit and advise lab of finding. Abnormal wear indicated by *** PPM (element).
R**	Do not fly or operate; inspect filters, screens, chip detector and sumps; advise laboratory of results.
T**	Do not fly or operate. Examine for discrepancy and advise laboratory of results and disposition. If discrepancy found and corrected, continue operation and submit resample after *** hours of operation. If discrepancy is not found, recommend remove component from service and send to maintenance.

CODE	OIL CHANGE RECOMMENDATIONS (Requires Resample)
J	Contamination confirmed. Change oil, sample after *** minute run-up and after *** operating hours.
W	Contamination suspected. Change oil; run for *** additional hours, take samples hourly. (This code for Air Force ALC Depot use only).

CODE	LAB REQUESTED RESAMPLES (Requires Resample)
B*	Resample as soon as possible; do not change oil.
C*	Resample after *** hours; do not change oil.
E*	Do not change oil. Restrict operations to local flights or reduced load operation, maintain close surveillance and submit check samples after each flight or *** operating hours until further notice.
F*	Do not change oil. Submit resample after ground or test run. Do not operate until after receipt of laboratory result or advice.
G*	Contamination suspected; resample unit and submit sample from new oil servicing this unit.
P*	Do not fly or operate; do not change oil; resubmit resample as soon as possible.

NOTES:

*Resample (red cap) required
**Maintenance feedback required; advise laboratory of findings
***Laboratory will specify time limit

STANDARD LAB RECOMMENDATION CODES - NON AERONAUTICAL FOR SPECTROMETRIC ANALYSIS
(Not for Air Force Use)

CODE	GENERAL LAB RECOMMENDATIONS
A	Sample results normal; continue routine sampling.
X	Analysis results supplied to customer; no recommendation required.
Z	Previous recommendation still applies.

CODE	INSPECTION RECOMMENDATIONS (Requires Feedback)
H**	Inspect unit and advise lab of finding. Abnormal wear indicated by (element) (PPM). Resample after (maintenance/***hours/etc.).
K**	Impending failure, critical wear indicated by (element). Inspect unit and advise lab of findings. Resample after (maintenance/***hours/etc.).
L**	Inspect brake and clutch plate adjustments, change oil service filters, resample after *** hours of operation.
M**	Perform engine coast-down check. If engine fails test, examine for discrepancy and advise lab of results, else resample after *** hours of operation.
U**	Cooling system leak indicated by (Mg/Cr/Na/B). Inspect unit and advise lab of findings. Resample after (maintenance/***hours/etc.).

CODE	OIL CHANGE RECOMMENDATIONS (Requires Resample)
D	Change oil and service filters. Resample after *** hours of operation.

CODE	LAB REQUESTED RESAMPLES (Requires Resample)
B*	Resample as soon as possible; do NOT change oil.
C*	Resample after *** hours.
F*	Do not change oil; submit special sample after test run. Do not operate until after receipt of laboratory results or advice.
G*	Contamination suspected; resample unit and submit sample from new oil servicing this unit.
N*	Unit 'wear-in' indicated; resample in accordance with break-in schedule or after *** hours.
I*	Stop purification, resample each engine after 4 hours of operation.
P*	Do not operate; do not change oil; submit resample as soon as possible.

NOTES:

*Resample (red cap) required
**Maintenance feedback required; advise laboratory of findings
***Laboratory will specify time limit

STANDARD LAB RECOMMENDATION CODES - PHYSICAL TEST RECOMMENDATIONS
(Not for Air Force Use)

CODE	RECOMMENDATION
AA	Oil condition normal; continue routine sampling.
DN	Do not operate.
ER	Evaluate and repair component.
TS	Check oil type and source.
ZZ	Previous recommendation still applies.
XX	Analysis results supplIn reply to:ed to customer; no recommendation required.

CODE	OIL CONDITION STATEMENTS
FD	Fuel dilution.
NN	Neutralization or acid number.
PC	Particle count excessive.
PN	Precipitation number.
SA	Solid or abrasive material.
VS	Viscosity (high/low/change).
WA	Water

CODE	OIL CHANGE RECOMMENDATIONS
CS	Change oil and service filter.
CP	Purify, renovate or change oil and service filters.

CODE	LAB REQUESTED SAMPLES (Requires Resample)
RB*	Resample as soon as possible.
RC*	Resample after *** hours.
RH*	Submit hot sample.
RI*	Resample; insufficient amount of sample received.
RS*	Submit sample of new oil servicing this unit.

CODE	**INSPECTION RECOMMENDATIONS (Requires Feedback)**
IA**	Inspect and repair air induction system.
IC**	Inspect and repair cooling system.
IF**	Inspect repair fuel system; change/service filters oil.
IW**	Inspect for source of water.

NOTES:

*Resample (red cap) required
**Maintenance feedback required; advise laboratory of findings
***Laboratory will specify time limit

APPENDIX B

JOAP LABORATORY LISTING

DOD LABORATORIES

****JOAP-TSC, FL

US ARMY LABORATORIES

** Anniston Army Depot, AL
** Bamberg, Germany
** Camp Stanley, Korea
** Corpus Christi Army Depot, TX
** Combat Equipment Group-Asia (CEG-A), Goose Creek, SC
* Fort Benning, GA
** Fort Bliss, TX
** Fort Bragg, NC
** Fort Campbell, KY
** Fort Carson, CO
** Fort Drum, NY
** Fort Hood, TX
** Fort Irwin, CA
** Fort Knox, KY
** Fort Lewis, WA
** Fort Polk, LA
** Fort Richardson, AK
** Fort Riley, KS
** Fort Rucker, AL
* Fort Sill, OK
** Hunter Army Air Field, GA
* Letterkenny Army Depot, PA
** Mobile Lab 1, SC
** Mobile Lab 2, TX
** Red River Army Depot, TX
** Sandhofen, Germany

US NAVY LABORATORIES

Atsugi NAF, Japan
Cherry Point NADEP, NC
Corpus Christi NAS, TX
Fallon NAS, NV
Iwakuni MCAS, Japan
Jacksonville NADEP, FL
Key West NAS, FL
Lemoore NAS, CA
***Mayport SIMA, FL
Meridian NAS, MS
***Norfolk Mid-Atl Regional, VA
Oceana NAS, VA
***Pearl Harbor NSY, HI
Patuxent River NAS NAWC, MD
***Roosevelt Roads NAVSTA, Puerto Rico
***San Diego SIMA, CA
***Sigonella NAS, Italy
***USS ABRAHAM LINCOLN
USS BATAAN
USS BELLEAU WOOD
USS BONHOMME RICHARD
USS BOXER
***USS CARL VINSON
***USS CONSTELLATION
***USS DWIGHT D EISENHOWER
***USS ENTERPRISE
USS ESSEX
***USS GEORGE WASHINGTON
USS HARRY S TRUMAN
USS INCHON
USS IWO JIMA
***USS JOHN C STENNIS
***USS JOHN F KENNEDY
USS KEARSARGE
***USS KITTY HAWK
***USS NASSAU
***USS NIMITZ
USS PELELIU
***USS THEODORE ROOSEVELT
USS SAIPAN
USS TARAWA
USS WASP
Yuma MCAS, AZ
Whidbey Island NAS, WA

USS AIR FORCE LABORATORIES

99 ERS (deployed), France
Al Jaber AB , Saudi Arabia
Alpena CRTC, MI
Andersen AB, Guam
Andrew AFB, MD
Arnolds AFB, TN
Atlantic City ANGB
Aviano AB, Italy
Bangor ANGB
Barksdale AFB, LA (2nd)
Barksdale AFB, LA (917th)
Barnes ANGB, MA
Battle Creek ANGB, MI
Beale AFB, CA
Bradley ANGB, CT
Buckley ANGB, CO
Burlington IAP, VT
Calspan, NY
Cannon AFB, NM
Cape Canaveral Aerospace Fuels Lab, FL
Capital Airport, IL
Columbus AFB, MS
Dannelly Field, AL
Davis Monthan AFB, AZ
Des Moines IAP, IA
District of Columbia ANG, MD
Dover, DE
Duluth IAP MN
DynCorp NASA, TX
Edwards AFB, TX
Eglin AFB, FL (33rd)
Eglin AFB, FL (46th)
Eielson AFB, AK
Ellington ANGB, TX
Elmendorf AFB, AK
Fairchild AFB, WA (92nd)
Fairchild AFB, WA (141st)
Forbes Field, KS
Fort Smith ANGB;, AR
Fort Wayne IAP, IN
Forth Worth NAS JRB, TX
Fresno ANGB, CA
Geilenkirchen AB, Germany
Gowen Field, ID
Great Falls IAP, MT
Grissom AFB, IN
Gulfport ANG CRTC, MS
Hancock Field, NY
Hector Field, ND
Hickham AFB, HI
Hill AFB, UT (388th)
Hill AFB, UT (419th)
Holloman AFB, NM
Homestead AFB, FL
* Howard AFB, Panama
Hulman Field, IN
Hurlburt Field, FL
Incirlik AB, Turkey
Jacksonville ANGB, FL
Joe Foss Field, SD
Kadena AB, Japan
Keflavik AB, Iceland
Kelly AFB, TX (149th)
Kelly AFB, TX (SA-ALC)
Key Field ANGB, MS
Kingsley Field, OR
Kirtland AFB, NM (58th)
Kirtland AFB, NM (150th)
Kunsan AB, Korea
Lajes Field, Azores
Lakenheath RAF, United Kingdom
Lambert IAP, MO
Langley AFB, VA
Laughlin AFB, TX
Lear Siegler Services, TX
Lockheed Martin Aeronautical Systems, GA
Lockheed Martin Skunkworks, CA
Louisiana ANG, LA (159th)
Luke AFB, AZ (58th)
Luke AFB, AZ (944th)
Mansour General Dynamics LTD, Saudi Arabia
March ARB, CA
Martin State Airport, MD
McEntire ANGB, SC
McGhee Tyson ANGB, TN
McGuire AFB, NJ (108th)
McGuire AFB, NJ (438th)
Mildenhall RAF, United Kingdom
Minot AFB, ND
Misawa AB, Japan
Moody AFB, GA
Moron AB, France
Mountain Home AFB, ID
Muniz ANGB, Puerto Rico
National Technical Systems, CA
Nellis AFB, NV
New Jersey ANG, NJ
New Orleans NAS JRB, LA
Offutt AFB, NE
O'Hare IAP, IL
Osan AB, Japan
Otis ANGB, MA
Paya Lebar AB, Singapore

AIR FORCE LABORATORIES (CONT)

Phoenix ANGB, AZ
Pittsburgh IAP, PA
Pope AFB, NC
Portland IAP, OR
Prince Sultan AB, Saudi Arabia
Ramstein AB, Germany
Randolph AFB, TX
Reno ANGB, NV
Richmond IAP, VA
Robins AFB, GA (9th)
Robins AFB, GA (93rd)
Robins AFB, GA (WR-ALC)
Salt Lake City IAP, UT
Savannah IAP, GA
Selfridge ANGB, MI
Seymour Johnson AFB, SC
Shaw AFB, SC
Sheppard AFB, TX
Sioux City Gateway Airport, IA
Spandahlem AB, Germany
Springfield Beckley MAP, OH
Thompson Field, MS
Tinker AFB, OK (507th)
Tinker AFB (OC ALC)
Toledo Express Airport, OH
Travis AFB, CA
Truax Field, WI
Tucson IAP, AZ
Tulsa IAP, OK
Tyndall AFB, FL
USAF Thunderbirds, NV
Vance AFB, OK
Volk Field ANG CRTC, WI
Whiteman AFB, MO (442nd)
Whiteman AFB, MO (509th)
Willow Grove ARS, PA
Wright Patterson AFB, OH (88th)
Wright Patterson AFB, OH (445th)

* Laboratories with the following physical properties testing capabilities:

Blotter
Crackle
Viscosity

**Laboratories with the following physical properties testing capabilities:

Blotter
Crackle
Viscosity
Ferrography
Fourier Transform Infra Red Spectrometer

***Laboratories with the following physical properties testing capabilities:

Acidity
Fuel Dilution (Setaflash)
Neutrality number
pH
Particle Count (HYAC)
Precipitation number
Water (Crackle)
Water (Aquatest VIII)
Viscosity

****Laboratories with the following physical properties testing capabilities:

Acidity
Fuel Dilution (Setaflash)
Neutrality number
pH
Particle Count (HYAC)
Precipitation number
Water (crackle)
Water (Aquatest VIII)
Viscosity
Fourier Transform Infra Red Spectrometer

APPENDIX C

JOAP DATA BASE REPORTS

B003EFIA\ OAP TRANSACTIONS BY LABORATORY AS OF 18 OCT 85 PAGE 85

INCLUSIVE DATES: START MONTH 09 YEAR 85 END OF MONTH 09 YEAR 85

LABORATORY ATF ENGLAND AFB LA

GROUNDING RECOMMENDATIONS

MAJOR COMMAND	END ITEM MODEL	EQUIP MODEL	ROUTINE SAMPLES	SPECIAL SAMPLES	TOTAL SAMPLES	RESAM ASAP	RETRN AFTER PLG CK	TO DEPOT	PREV EXAM ADVSE	GND APPLS	% GRND	AVG RESP TIME	OAP HITS	OAP MISS	OIL METD FAIL
				ACTIVITY GAHH	ENGLAND AFB										
TAC	A-10A	TF34-100	984	13	997					2	.2	1			
ACTIVITY GAHH	TOTALS:		984	13	997					2	.2	1			
				ACTIVITY LRXQ	JACKSON APT										
NGB	C-130H	T56-15	41		41							76			
NGB	C-130	GTC85-71	5		5							72			
ACTIVITY LRXQ	TOTALS:		46		46							75			
				ACTIVITY ZZZZ	TRANSIENT ACFT										
TAC	F-4G	J79-8	1		1							1			
TAC	F-5E	J85-21	22		22							1			
TAC	A-10A	TF34-100	2		2							1			
ACTIVITY ZZZZ	TOTALS:		25		25							1			
LABORATORY ATF CURRENT MONTH TOTALS:			1055	13	1068					2	.1	4			
YEAR TO DATE LABORATORY ATF TOTALS			18164	238	18402	3	1		11	11	.1	2	11		

THE OAP TRANSACTIONS BY LABORATORY REPORT MAY
BE USED TO EVALUATE A LABORATORY'S LEVEL OF
ACTIVITY AND OVERALL EFFECTIVENESS

B003ECIA OAP TRANSACTIONS BY COMMAND AS OF 18 OCT 85 PAGE 73

INCLUSIVE DATES: START MONTH 09 YEAR 85 END OF MONTH 09 YEAR 85

COMAND 3 TRAOOC

						GROUNDING RECOMMENDATIONS								
						RESAM	RETRN		PREV	AVG				OIL
	END ITEM	EQUIP	ROUTINE	SPECIAL	TOTAL	RESAM	AFTER	TO	EXAM	GND	%	RESP	OAP	OAP	METD
LABORATORY	MODEL	MODEL	SAMPLES	SAMPLES	SAMPLES	ASAP	PLG CK	DEPCT	ADVSE	APPLS	GRND	TIME	HITS	MISS	FAIL
					ACTIVITY HGQH FT LEE VA										
LANGLEY AFB VA	UH1H	T53-13	2		2							2			
LANGLEY AFB VA	UH1H	MAIN TRAN	1		1							2			
LANGLEY AFB VA	UH1H	42 DEG GB		1	1							2			
LANGLEY AFB VA	UH1H	90 DEG GB	2		2			1			50.0	2			
LANGLEY AFB VA	UH1H	SGL HYDGB	2		2			1			50.0	2			
LANGLEY AFB VA	UH1P	T58-3	1		1							2			
ACTIVITY HGQH	TOTALS:		8	1	9			2			22.2	2			
					ACTIVITY MUHJ LANGLEY AFB										
LANGLEY AFB VA	UH1H	T53-13	5		5							2			
LANGLEY AFB VA	UH1H	MAIN TRAN	1		1							2			
LANGLEY AFB VA	UH1H	42 DEG GB	2		2							2			
LANGLEY AFB VA	UH1H	90 DEG GB	1		1				1		100.0	2			
LANGLEY AFB VA	UH1P	T58-3	3		3							2			
LANGLEY AFB VA	UH1P	MAIN TRAN	1		1							2			
LANGLEY AFB VA	C&12	PT6A&38	57		57							2			
LANGLEY AFB VA	U-21A	T74-700	30		30							2			
ACTIVITY MUHJ	TOTALS:		100		100				1		1.0	2			
					ACTIVITY ZZZZ TRANSIENT ACFT										
LANGLEY AFB VA	UH1H	90 DEG GB	1		1	1					100.0	2			
ACTIVITY ZZZZ	TOTALS:		1		1	1					100.0	2			
COMMAND 3 CURRENT MONTH TOTALS:			109	1	110	1		2	1		3.6	2			
YEAR TO DATE COMMAND 3 TOTALS:			376	5	381	1		2	1		1.0	2			

THE OAP TRANSACTIONS BY COMMAND REPORT LISTS

THE OAP TRANSACTOINS BY COMMAND FOR LABORATORIES

AND SPECIFIC EQUIPMENT.

** F11** WEAR-METAL FREQUENCY DISTRIBUTION AS OF 17 JAN 85 PAGE 156
B003EK1A

INCLUSIVE DATES: START MONTH 01 YEAR 84 END MONTH 12 YEAR 84

EQUIPMENT/END ITEM MODEL: F-4D J79-15 SPECTROMETER: ATOMIC ABSORTION PE

PPM			FE	AG	AL	CR	CU	MG	NI	PB	SI	SN	TI	MO
		0	32	3123	2855	1936	43	160	363	251	222	249	357	2
		1	388	52	283	953	415	813	23	1	24	1	26	
		2	855	2	18	213	844	770			53		4	
		3	737		6	42	848	544			34			
		4	429		5	28	533	313			24			
		5	287		3	4	218	216			10			
		6	175	1	4	1	138	135			8			
		7	110				33	103			3			
		8	68		2		34	54			2			
		9	30		1		24	24			1			
		10	31		1	1	13	12			3			
		11	16				8	4						
		12	11				5	1						
		13	4				5	5						
		14	2				6	3						
		15					5	2						
16	TO	17					4	6						
18	TO	19						2						
20	TO	21				1		3						
22	TO	23						1						
24	TO	25	1					2						
26	TO	28						1						
29	TO	31	1					2						
35	TO	37									1			
50	TO	54					2							
80	TO	84	2											
100	TO	104			1									
150	TO	9999		1			1	2	1		2	3		
TOTAL SAMPLES			3179	3179	3179	3179	3179	3178	387	252	387	253	387	2
ABNORMAL LEVELS														
MEAN			3.46	0.09	0.16	0.52	3.25	3.03	0.70	0.00	2.67	2.37	0.08	0.00
% BELOW ABNORMAL LEVEL														
95%			8.00	0.00	1.00	2.00	6.00	7.00	1.00	0.00	6.00	0.00	1.00	0.00
97%			9.00	0.00	1.00	2.00	8.00	8.00	1.00	0.00	7.00	0.00	1.00	0.00
99%			11.00	1.00	2.00	4.00	11.00	11.00	1.00	0.00	10.00	200.00	2.00	0.00
99.7%			13.00	1.00	5.00	4.00	15.00	21.00	1.00	1.00	249.00	200.00	2.00	0.00

THE WEAR-METAL FREQUENCY DISTRIBUTION CHART
MAY BE USED TO ILLUSTRATE TRENDS AND TO
MONITOR CURRENT WEAR METAL CRITERIA GUIDELINES
FOR ACCURACY.

B003EHIA EQUIPMENT FINAL TOTALS AS OF 19 OCT 85 PAGE 1

INCLUSIVE DATES: START MONTH 09 YEAR 85 END MONTH 09 YEAR 85

		CURRENT MONTH GROUNDING RECOMMENDATIONS										YEAR TO DATE GROUNDING RECOMMENDATIONS									
END ITEM MODEL	EQUIP MODEL	RESAM ASAP	PLUG CK	RETRN TO DEPOT	EXAM ADVSE	PREV GND APPLS	HITS	DIL METD MISS	FAIL	TOTAL SAMPLES		RESAM ASAP	PLUG CK	RETRN TO DEPOT	EXAM ADVSE	PREV GND APPLS	HITS	OIL METD MISS	FAIL	TOTAL SAMPLE	
T-333	J33-20									3										29	
T-338	290 DG GB																			1	
T-1A	J33-24																			1	
T-33A	J33-35	16			3	2				1193		72			3	37	11	5		8887	
T-33A	290 DG GB																			1	
OT-33A	290 DG GB																			1	
F&86E	J47&13									10		2					2				207
F&86K	J47&17																			4	
OF-9G	290 DG GB																			1	
A-4F	J52-6									3										18	
TA-4J	J52-6									23		1								195	
A-6A	J52-6																			1	
EA-6A	J52-6									4											4
A-6B	J52-6									2										7	
SMB&2	J52&8																			14	
A-4E	J52-8									11		1			1	3	1				191
A-4F	J52-8																			5	
TA-4F	J52-8																			26	
TA-4J	J52-8																			20	
EA-6A	J52-8	SPECIAL DEMAND REPORTS SUCH AS THE								39										123	
EA-6B	J52-8	EQUIPMENT FINAL TOTALS MAY BE USED																		20	
KA-6D	J52-8	TO EVALUATE THE EFFECTIVENESS OF																		4	
A-6E	J52-8	THE OIL ANALYSIS PROGRAM BY TYPE								57										141	
		EQUIPMENT.																			

Navy Ships
Components Enrolled in NOAP
Report Period Ending
31 Dec 1985

Sort Code : 280

Unit Name: CCMDESRON TWENTY-FIVE
UIC No. : NC134A
Hull No. : CG49

For SIMA San Diego CA
Report Date: 29 January 1986
By Date Sample Taken

Index	EIC	Nomenclature	Unit No.	Component Serial No.	Hrs Last Taken	Hrs Next Due	Date Last Sample Taken	Date Next Sample Due	No. Days Overdue	Lab Recommendation Number Date
5552	3108	SSG60GT	1	ASP92E	3174	3274	23 Dec 1985 -	23 Mar 1896		
5553	3108	SSG60GT	2	ASP93C	3578	3678	27 Dec 1985 -	27 Mar 1986		
5554	3108	SSG60GT	3	ASP872	1166	1266	12 Dec 1985 -	12 Mar 1986		
7058	3500	GTSSEGM	1 GTG	ASP92B	2384	2484	08 Oct 1985 -	06 Jan 1986		
5406	3540	GTGENREDGR	1	36175	3174	3274	12 Nov 1985 -	10 Feb 1986		
5404	3540	GTGENREDGR	2	36176	3711	3811	08 Jan 1986 -	08 Apr 1986		
5405	3540	GTGENREDGR	3	36177	689	789	09 Oct 1985 -	07 Jan 1986		
5397	D110	MPMDGT	1A	153	1036	1136	26 Dec 1985 -	26 Mar 1986		
5400	D110	MPMDGT	1B	155	821	921	26 Dec 1985 -	26 Mar 1986		
5401	D110	MPMDGT	2A	154+	946	1046	26 Dec 1985 -	26 Mar 1986		
5402	D110	MPMDGT	2B	152	978	1078	26 Dec 1985 -	26 Mar 1986		
5414	D410	MPMDGTORP	1	LX1064+LX	UNK	UNK	31 Jul 1985 -	29 Oct 1985	* 072 *	
5415	D410	MPMDGTORP	2	1063	UNK	UNK	17 Oct 1985 -	15 Jan 1986		
5557	D431	LSBMPGT	1A	SN3	9204	9304	08 Jan 1986 -	08 Apr 1986		
5558	D431	LSBMPGT	2A		2159	2259	18 Dec 1985 -	13 Mar 1986		
5559	D431	LSBMPGT	2B	SN1	2159	2259	18 Dec 1985 -	18 Mar 1986		
5560	D431	LSBMPGT	2C	SN2	1702	1802	08 Jan 1986 -	08 Apr 1986		
5561	D431	LSBMPGT	2D	SN4	1702	1802	08 Jan 1986 -	08 Apr 1986		
5555	F001	MPMDSTREDGR	1	902785	9204	9304	08 Jan 1986 -	08 Apr 1986		
5556	F001	MPMDSTREDGR	2	902787	2159	2259	19 Dec 1985 -	19 Mar 1986		
5562	T40S	AIR114OWOMP	1	2263	5175	5275	11 Oct 1985 -	09 Jan 1986		
5563	T40S	AIR114OWOMP	2	2264	3209	3309	11 Jun 1985 -	09 Sep 1985	* 122 *	
5564	T40S	AIR114OWOMP	3	2266	3267	3367	11 Jun 1985 -	09 Sep 1985	* 122 *	
5565	T40S	AIR114OWOMP	4	2265	3309	3409	11 Jun 1985 -	09 Sep 1985	* 122 *	
5412	T503	REFR12DXCMP	1	LM194914	UNK	UNK	09 Sep 1985 -	08 Dec 1985	* 032 *	
5413	T503	REFR12DXCMP	2	LM194915	UNK	UNK	09 Sep 1985 -	08 Dec 1985	* 032 *	
5407	TF01	HIPACCMP	1	XM50660	565	665	29 Oct 1985 -	27 Jan 1986		
5408	TF01	HIPACCMP	2	XM50661	3991	4091	29 Oct 1985 -	27 Jan 1986		
5409	TF03	IELPACCMP	1	XM507656	1500	1600	26 Dec 1985 -	26 Mar 1986		
5410	TF03	IELPACCMP	2	XM50757	2444	2544	28 Oct 1985 -	26 Jan 1986		
5411	TF03	IELPACCMP	3	XM50786	1874	1974	22 Oct 1985 -	20 Jan 1986		
5416	TL01	STRGPHYPMP	1A	MX370939	900	1000	25 Nov 1985 -	23 Feb 1986		
5417	TL01	STPGRHYPMP	1B	MX370940	874	974	25 Nov 1985 -	23 Feb 1986		
5418	TL01	STPGRHYPMP	2A	MX373260	880	980	25 Nov 1985 -	23 Feb 1986		
5419	TL01	STRGRHYPMP	2B	MX370941	900	1000	25 Nov 1985 -	23 Feb 1986		
5566	TM01	RECCVWINCH	RAST	DOP0012	2	102	11 Jun 1985 -	09 Sep 1985	* 122 *	
5567	TM04	ANCWNDLS	P/GEAR	AW154	UNK	UNK	09 Jan 1986 -	09 Apr 1986		
7315	TM04	ANCWNDLS	S/GEAR		UNK	UNK	08 Jan 1986 -	08 Apr 1986		

Total Components Enrolled = 38
Total Components Exceeding Sampling Interval = 7
Total Recommendations with no Feedback = 0

Sampling Intervals set at 102 hours are 90 Days

THIS REPORT MAY BE USED TO IDENTIFY UNITS ENROLLED IN JOAP, MONITOR SAMPLING COMPLIANCE, ASSIST IN SAMPLE SCHEDULING, AND ENSURE FEEDBACK REQUIREMENTS ARE COMPLIED WITH.

NON-AERONAUTICAL
LABORATORY WORKLOAD SUMMARY
AT FT. CAMPBELL, KY
1 JUNE 1985 - 30 JUNE 1985

REPORT DATE: 03 JULY 1985

---------- FOR SAMPLES RECEIVED ----------

			------ UNIT SUMMARY ------			------ TYPE SAMPLE ------		-- LAB RECOMMENDATION --					
SORT CODE	UIC	UNIT NAME	END ITEMS	COMP.	% DEL	FEEDBKS REQ'D	TOTAL	ROUTINE	LAB REQ.	OTHER	NORM.	RESAMPLE	CHANGE OIL	INS
203	WQ4CAA	478 PER SER, CHICAGO, IL 60623	1	1	100	0	0	0	0	0	0	0	0	0
203	WQ5DAA	457 ENG DET, HURLEY WI 54534	8	10	40	0	0	0	0	0	0	0	0	0
203	WRJ4AO	A 397 ENG BN, LADYSMITH, WI 54848	18	21	0	1	22	22	0	0	21	0	1	0
203	WRJ4BO	B 397 ONALASKA, WI 54650	15	18	0	0	2	0	2	0	0	1	1	0
203	WRJ4CO	C 397 ENG, EAU CLAIRE, WI 54701	15	18	33	0	0	0	0	0	0	0	0	0
203	WRJ4DO	D 397 ENG, WAUSAU, WI 54401	19	22	4	0	22	21	1	0	21	1	0	0
203	WRJ4TO	HHC 397 ENG,EUA CLAIRE, WI 54701	27	33	9	0	28	28	0	0	27	0	1	0
203	WROCAA	624 ENG,GRANITE CITY, IL 62040	3	3	0	0	1	0	1	0	0	3	0	0
203	WRX8AO	A 389 ENG, ONALASKA, WI 54650	24	31	0	0	11	7	4	0	8	1	0	0
203	WRX8DO	D 389 ENG, DODGEVILLE, WI 53533	36	46	6	0	25	23	2	0	22	0	2	0
203	WRXMAA	HHC 416 ENCOM, CHICAGO, IL 60623	3	3	0	0	0	0	0	0	0	0	0	0
203	WRYZAA	652 ENG, AF RES CNTR, JOLIET 60436	60	68	10	0	42	42	0	0	42	0	0	0
203	WRZVAA	336 ENG DET, HURLEY WI 54534	6	6	0	0	0	0	0	0	0	5	0	0
203	WS5KAO	A 863 ENG BN, HARFVEY, IL 60426	20	21	19	0	17	17	0	0	9	0	3	0
203	WS5KB1	DET 1, B 863 ENG, KANKAKEE, IL	5	5	80	0	0	0	0	0	0	0	0	
203	WS5KBO	B 863 ENG, FT SHERIDAN, IL 60037	20	20	15	0	1	1	0	0	1	0	0	0
203	WSBKC1	DET 1, C 863 ENG, KANKAKEE, IL	4	4	50	0	0	0	0	0	0	5	0	0
203	WS5KCO	C 863 ENG, ROCKFORD, IL 61101	34	52	3	0	40	40	0	0	34	1	1	0
203	WS5KDO	D 863 ENG, KANKAKEE, IL 60901-2631	16	17	76	0	1	1	0	0	0	1	0	0
203	WS5KTO	HHC 863 ENG BN, AURORA, IL 60507	7	7	0	0	7	7	0	0	6	1	0	0
203	WS5MAO	A 961 ENG BN, MILWAUKEE, WI 53218	20	20	15	0	16	16	0	0	14	1	1	0
203	WS5MBO	B 961 ENG, RACINE, WI 53405	21	21	23	0	10	10	0	0	8	2	0	
203	WS5MCO	C 961 ENG, MILWAUKEE, WI 53218	18	18	0	0	7	7	0	0	4		0	0
203	WS5MDO	B 961 ENG, MILWAUKEE, WI 53072	20	20	15	0	0	0	0	0	0	0	0	0
203	WS5MTO	HQ 961 ENG 9N, MILWAUKEE, WI 53218	3	3	66	0	0	0		0	0	0	0	0
203	WVDDAA	336 ENG PLT, HURLEY, WI 54534	2	2	0	0	0	0	0	0	0	0	0	0
203	WVKZAA	327 ENG (PB), ELLSWORTH, WI 54011	7	9	0	0	10	9	0	0	9	1	0	0
TOTALS FOR ALL UIC'S FOR SORT CODE 203			432	499	20	1	262	251	11	0	226	26	10	0

THIS REPORT MAY BE USED TO IDENTIFY WORKLOAD AND ASSIST MANAGERS IN WORKLOAD COORDINATION AND MANAGEMENT.

APPENDIX D

OASIS Data Base Structure Summary

Structure for Database: TAPEFILE.DBF

Fld	Fld Name	Type	Width	Dec	Start	End	
1	TRANSCODE	C	1		1	1	Code for Transaction being recorded I - Initial Record for this Sample C - Change Record for Sample D - Sample Deleted Record F - Feedback Record U - Undelete Sample Record
2	DT_STAMP	C	14		2	15	Date and time record created Format = YYYYMMDDHHMMSS
3	TYPEQUIP	C	1		16	16	Type of Equipment (Air, Grd, Qa, etc)
4	TEC	C	4		17	20	Component TEC
5	ACCES	C	1		21	21	Currently Unused
6	COMPSN	C	15		22	36	Component Serial Number
7	DT_SAMPLE	C	8		37	44	Date Sample Taken
8	SAMPNO	C	5		45	49	Sample Number
9	COMPMOD	C	12		50	61	Component Model Number
10	EISN	C	12		62	73	End Item Serial Number at Time Component Sampled
11	EIMOD	C	11		74	84	End Item Model Number
12	UIC	C	6		85	90	UIC at time Component Sampled
13	MAJCOM	C	3		91	93	Major Command of UIC in Field 12
14	LABCODE	C	3		94	96	Testing Labs Lab Code
15	TRANSIT	C	2		97	98	Days from Sample Date to Received
16	REASSAMP	N	1		99	99	Reason for this sample
17	HRSCOMP	N	6		100	105	Hours since last complete overhaul
18	HRSOIL	N	4		106	109	Hours since last oil change
19	OIL	C	3		110	112	Amount of Oil Added
20	MEAS	C	1		113	113	Measurement unit of Oil Added
21	LABREC	C	1		114	114	Lab Rec for this sample
22	COMPREC	C	1		115	115	Calculated Computer Rec for Sample
23	SPEC_REDG	C	60		116	175	Spectrometer readings and Flags in Character format (15 elements)
24	MILEIND	C	1		176	176	Mileage Reading (M, K, or H)
25	MILEAGE	N	6		177	182	Mileage or Hours usage
26	REMARKS	C	30		183	212	1st 30 characters or remarks field Fields 27 thru 38 will be blank of 0's in cases where component does not require physical tests
27	CRACKLE	C	3		213	215	Crackle test results code
28	VISC	C	3		216	218	Viscosity test results code
29	FUELDIL	C	3		219	221	Fuel dilution percente
30	INSOL	C	3		222	224	Solubility test results code
31	PHYSREC1	C	2		225	226	Lab Physical Rec. Code 1
32	PHYSREC2	C	2		227	228	Lab Physical Rec. Code 2
33	PHYSREC3	C	2		229	230	Lab Physical Rec. Code 3
34	TEMP	C	3		231	233	Oil temp. for physical test
35	CONTAM	C	1		234	234	Contamination results code
36	COOL	C	1		235	235	Coolant test results code
37	ALKIN	C	1		236	236	Alkalinity test results code

APPENDIX D

OASIS Data Base Structure Summary

Structure for Database: TAPEFILE.DBF - continued

Fld	Fld Name	Type	Width	Dec	Start	End	
38	DISPERS	C	1		237	237	Dispersancy test results code Fields 39 thru 45 will be blank or 0's for all records which are not feedback records
39	DT_FB	C	8		238	245	Date feedback received
40	ACTION	C	1		246	246	Feedback action code
41	HOWFND	C	1		247	247	Feedback How found code
42	DISITEM	C	2		248	249	Feedback Discrepancy code
43	HOWMAL	C	1		250	250	Feedback How Malfunctioned code
44	ACTION2	C	1		251	251	2nd feedback Action code
45	FBRMKS	C	29		252	280	Remarks from feedback
46	DT_ANAL	C	8		281	288	Date Sample Analyzed
47	HOWTAKEN	C	1		289	289	How sample was taken
48	TYPEOIL	C	1		290	290	Type Oil used
49	SAMPTEMP	C	1		291	291	Temperature from physical test
50	DT_RECEIV	C	8		292	299	Date Sample received in lab
51	EVALSPEC	C	3		300	302	Initials of Spectro Evaluator
52	EVALPHYS	C	3		303	305	Initial of Physical Evaluator
53	CHGCOUNT	C	1		306	306	Number this change is if fld 1 = C
54	DT_XFER	D	8		307	314	Date record sent to Log SA
55	CHG_ID	C	1		315	315	Identifies change as Physical or Spectrometer Change
**	Total **		316				

Appendix D (continued)

US Army Oil Analysis Reports

1. (Monthly) Resample and Type Recommendation Report

   This report is a summary of the latest samples with a laboratory recommendation other than normal. A recommendation is considered abnormal if it is other than an "A" for spectrometric advices or other than "AA" for physical advices. In case of ground equipment with an advice code of "Z" (previous recommendation still applies), the number of Z advices is also counted and reported.

   The report shows the component serial number, end-item model, end-item serial number, component model, date sample analyzed, either the physical or spectrometric lab advice depending on the level of significance of the advice code, and a narrative interpretation of the advice code.

   The report items are grouped by UIC. The report may address only specific UIC's, Sort Codes, or all UIC's. See page D-5 for an example of this report.

2. (Monthly) Monthly Activity Report

   The Monthly Activity Report is grouped by UIC, and up to four copies may be requested. The report shows the component model, component serial number, end-item serial number, sample number, date sample analyzed, days in transit, hours since overhaul, hours since oil change, reason for sample and either the physical or spectrometric lab advice depending on the level of significance of the advice code.

   This information is shown for all samples for each piece of equipment. The report also includes totals for number of samples analyzed for the month, the average days in transit, and the n umber of samples processed with 'UNKNOWN" HSOH (hours since overhaul) and HSOC (hours since oil change). See page D-6 for an example of this report.

3. (Monthly) End Item Configuration Report

   The End Item Configuration Report shows the end-item model, end-item serial number, UIC, component model, component serial number, and dates of the last five samples taken. This report is sorted by end-item serial number, component model, and component serial number. See page D-7 for an example of this report.

4. (Monthly) Summary by Equipment Type Report

   The Summary by Equipment Type Report is a summary of laboratory recommendations given for samples processed for the previous month. See page D-8 for an example of this report.

5. (Monthly) Components Enrolled Report

   The Components Enrolled Report lists the history records that contain a sample processed in the lab during the reporting period. The report includes all components enrolled through the last day of the previous month.

   The top of the report shows the sort code, UIC, unit name and address, report date, and name of the laboratory.

   For ground equipment, the body of the reports shows bumper number, end-item model, end-item serial number, component model, component serial number, hours since overhaul, hours since oil change, sampling interval hours/days, date sample taken, reason sampled, and remarks. If the equipment is TDY, the word TDY will appear in the remarks column.

The report is sorted by sort code, UIC, end-item serial number, TEC, and the component serial number and bumper number for ground equipment. See pages D-9 and D-10 for an example of this report.

6. Laboratory Workload Summary Report

The Laboratory Workload Summary report is sorted by sort code, UIC, end-item serial number, component TEC, and component serial number. The report shows a breakdown of lab recommendations, reasons for sample, and feedback required for samples within a UIC. The report is a summary of samples analyzed during the previous month.

The "unit summary" part of the report shows the number of end-items enrolled, the number of components enrolled, and the number of feedback required within a UIC. In addition for ground equipment, the report shows the percentage of components that have no usage reported and the percentage of components that are delinquent. Delinquency occurs when an enrolled component is not sampled during the established sampling interval.

The "type sample" part of the reports shows a breakdown of the reason for sample codes given to the samples. Any samples with the reason "R" are classified as routine; any with an "L" are classified as lab requests, and all others are classified as "other".

The "lab recommendation" part of the report shows either the physical or spectrometric lab advice depending on the level of significance in the advice code file for the samples. The advices are grouped as normal, resample, purify oil, and inspect. See pages D-11 and D-12 for an example of this report.

6. (On Request) Laboratory Response Time Report

This report is automatically produced when the laboratory workload summary is selected. The Laboratory Response Time Report reflects the number of days between receiving and processing a sample. The report is a summary of the number of samples processed within 0-10 days, over 10 days, unknown days, total samples processed, and the average response time in days.

The grand totals produced by the report are saved in a disk file for transmission of FSA (PROV). See page D-13 for an example of the report.

7. (Monthly) Usage and Sample Status Report

The end-item usage and component status report is produced on a monthly basis by UIC for ground equipment only.

The report shows the bumper number, component model, end-item model, end-item serial number, end-item meter reading, component serial number, sample number, date sample taken, date sample next due, days delinquent, feedback required, sample number, date, and remarks. Totals are provided end-items enrolled, components enrolled, end-items with no usage, recommendations with no feedback, components delinquent, and percentage of end-items with no usage. See page D-14 for an example of this report.

NON-AERONAUTICAL

SORT CODE:

065 RESAMPLE AND TYPE RECOMMENDATION REPORT

BY FT. CAMPBELL REPORT DATE: 19 APRIL 1994

UIC NO. :WABOTO BY DATE SAMPLE RECEIVED

UNIT NAME: 1ST BN 5TH SPECIAL FORCES
ATTN: AOAP POC
FT CAMPBELL, KY 42223-5000

END-ITEM MODEL	END-ITEM SERIAL NO.	COMPONENT MODEL	COMPONENT SERIAL No.	DATE ANALYZED	RECOMMEND LAB CODE	NARRATIVE	CODE	PREVIOUS REQUESTS
M35A2	022515329	LDT-465-1C	3802058	11/06-92	B OIL	RESAMPLE ASAP DO NOT CHANGE		

SORT CODE: 212

NON-AERONAUTICAL

065 OIL ANALYSIS MONTHLY ACTIVITY REPORT

FOR SAMPLE AND ANALYZED DURING REPORT DATE: 11 APRIL 1994

UIC NO. :WOXY26 JANUARY, 1992 COMMAND : FORSCOM

UNIT NAME: MAINTENANCE DIV,
FT MCCOY, ATTN: AFZR-DLM-CV
FT MCCOY, SPARTA WI, 54656

COMPONENT MODEL	COMPONENT SERIAL #	END ITEM SERIAL #	SAMPLE NUMBER	DATE ANAL	DAYS TRANS	HRS OVH	HRS SINCE OIL CHANGE	REASON FOR SAMPLE	LAB ADVICE
NHC-250	750697	10377	2501	01/30/92	8	2270	1814	ROUTINE	NORMAL
5R82	1078	61G1060	1532	01/21/92	4	UNKNOWN	UNKNOWN	ROUTINE	RESAMPLE ASAP
DD6V92	N2956535	6JD032163	2499	01/30/92	3	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
CAT D333	2S13372	75E1091	168	01/06/92	3	UNKNOWN	510	ROUTINE	NORMAL
3R2211	2368	75E1738	2511	01/30/92	3	UNKNOWN	53	ROUTINE	NORMAL
5R6192	IHC00725	7GB00662	2436	01/29/92	6	UNKNOWN	2705	ROUTINE	NORMAL
5R6192	IHC00726	7GB00664	2437	01/29/92	6	UNKNOWN	1720	ROUTINE	NORMAL
DD6V92	06VF163109	8JD032164	2532	01/31/92	2	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
HT750DRD	2510124937	8JD032164	2531	01/31/92	2	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
DD6V92	N2956544	8JD032164	2534	01/31/92	2	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
CASE 504BD	10367709	9160408	2500	01/30/92	3	UNKNOWN	863	ROUTINE	NORMAL
CASE 504BD	10367789	9160413	185	01/06/92	3	UNKNOWN	19	LAB REQUEST	NORMAL
CASE 504BD	10367511	9160420	186	01/06/92	3	UNKNOWN	965	LAB REQUEST	CHANGE OIL &
CASE 504BD	10367511	9160420	2199	01/28/92	4	UNKNOWN	UNKNOWN	LAB REQUEST	RESAMPLE AFTER
TT2421-1	5110142354	9160420	2438	01/29/92	6	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
360311	130805	A177B26354K	2510	01/30/92	3	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
ISUZU C240	709267	A177B26354K	2497	01/30/92	3	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
NHC-250	10265252	C12610198	2498	01/30/92	3	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
NHC-250	752034	C12610356	2435	01/29/92	6	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
NHC-250	10287488	C14010023	2533	01/31/92	2	UNKNOWN	13	ROUTINE	NORMAL
HT750DRD	2510124974	JD032163	2512	01/30/92	3	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
IHC S-700	1662	U002932	154	01/06/92	3	UNKNOWN	UNKNOWN	ROUTINE	NORMAL
IHC DT-466B	194904	U002932	169	01/06/92	3	UNKNOWN	133	ROUTINE	NORMAL

SUMMARY FOR UIC: WOXY26

TOTAL SAMPLES ANALYZED	AVERAGE DAYS IN TRANSIT	TOTAL UNKNOWN OVERHAUL	TOTAL UNKNOWN OIL CHANGE
23	3.7	22	13

SUMMARY FOR LAB: Ft. Campbell

TOTAL SAMPLES ANALYZED	AVERAGE DAYS IN TRANSIT	TOTAL UNKNOWN OVERHAUL	TOTAL UNKNOWN OIL CHANGE
23	3.7	22	13

END-ITEM	END-ITEM MODEL	CUSTOMER S/N	COMPONENT UIC	COMPONENT MODEL	DATES LAST FIVE (5) SAMPLES TAKEN S/N
130G	7GB00662	WOXY26	5R6192	IHC00725	04/23/91 07/23/91 10/23/91 01/23/92 04/22/92
130G	7GB00662	WOXY26	CAT 3304 DIT	07211276	10/01/91 12/24/91 03/25/92 06/25/92 07/23/92
130G	7GB00663	WOXY26	5R6192	IHC00740	05/21/91 08/20/91 11/20/91 02/21/92 04/22/92
130G	7GB00663	WOXY26	CAT 3304 DIT	07211284	12/24/91 03/25/92 04/21/92 05/06/92 06/02/92
130G	7GB00664	WOXY26	5R6192	IHC00726	04/23/91 07/23/91 10/22/91 01/23/92 04/22/92
130G	7GB00664	WOXY26	CAT3304 DIT	07211292	08/27/91 10/01/91 12/24/91 03/25/92 06/25/92
22BM	129937	WOXY26	JN6I	618434	05/21/91 08/20/91 11/19/91 02/19/92 05/20/92
2500L	6JD032163	WOXY26	DD6V92	06VF163043	05/07/91 07/31/91 08/27/91 11/26/91 02/28/92
2500L	6JD032163	WOXY26	DD6V92	N2956535	05/07/91 07/31/91 10/29/91 01/27/92 04/24/92
2500L	8JD032164	WOXY26	DD6V92	06VF163109	05/07/91 07/31/91 10/30/91 01/28/92 04/30/92
21500L	8JD032164	WOXY26	DD6V92	N2956544	07/31/91 10/30/91 11/26/91 01/28/92 04/30/92
2500L	8JD032164	WOXY26	HT750DRD	2510124937	05/07/91 07/31/91 10/30/91 01/28/92 04/30/92
2500L	JD032163	WOXY26	HT750DRD	2510124974	07/31/91 10/29/91 01/27/92 04/24/92 07/23/92
ARTFT6	4D80256	WOXY26	DD-453N	D1192	11/09/92
ARTFT6	D1192	WOXY26	ALS 3331-1	63853	11/09/92 11/24/92
ARTFT6	D1192	WOXY26	HYD SYS	D1192	11/09/92
ARTFT6	E1425	WOXY26	DD-453N	4D0093571	08/20/91 11/19/91 02/19/92 03/04/92 05/19/92
ARTFT6	F1494	WOXY26	ALS 3331-1	6777976	06/03/89 11/08/89 05/16/90 05/20/90 07/11/90
ARTFT6	F1494	WOXY26	DD-453N	4D106329	11/09/92
ARTFT6	F1494	WOXY26	HYD SYS	F1494	11/09/92
CAT D7E	75E1091	WOXY26	3R2211	1366	09/17/91 10/01/91 11/19/91 02/24/92 05/26/92
CAT D7E	75E1091	WOXY26	CAT D333	2S13372	10/04/91 01/03/92 04/03/92 06/25/92 07/28/92
CAT D7E	75E1091	WOXY26	HYD SYS	75E1091	11/25/92
CAT D7E	75E1738	WOXY26	3R2211	2368	01/27/92 04/24/92 07/23/92 08/12/92 08/31/92
CAT D7E	75E1738	WOXY26	CAT D333	75E1738	12/03/91 03/04/92 03/24/92 04/17/92 07/23/92
CAT D7F	61G1060	WOXY26	5R82	1078	07/17/91 10/16/91 01/17/92 02/11/92 05/12/92
CAT D7F	61G1060	WOXY26	CAT 3306	61G1060	05/07/91 08/05/91 11/14/91 02/11/92 05/12/92

NON-AERONAUTICAL
AOAP SUMMARY BY EQUIPMENT TYPE FOR SAMPLES RECEIVED
BY FT. CAMPBELL
1 OCT 1992 - 31 OCT 1992

SORT CODE: 212

UIC NO: WABOTO
UNIT NAME: MAINTENANCE DIV,
COMMANDER
FT MCCOY, ATTN: AFZR-DLM-CV
FT MCCOY, SPARTA, WI 54656

END ITEM MODEL	COMP MODEL	NORMAL	RESAMPLE	CHANGE OIL	INSPECT EXAMINE	TOTAL SAMPLES	PERCENT NORMAL
130G	5R6192	3	0	0	0	3	100.00
130G	CAT 3304 DIT	1	1	0	0	2	50.00
2500L	DD6V92	1	0	0	0	1	100.00
2500L	HT750DRD	1	0	0	0	1	100.00
CAT D7F	CAT 3306	1	0	0	0	1	100.00
D60	NHC-250	1	0	0	0	1	100.00
H40XL-MIL	360311	2	0	0	0	2	100.00
H40XL-MIL	ISUZU C240	1	1	0	0	2	50.00
M10A	IHC DT-466B	1	0	0	0	1	100.00
M10A	IHC S-700	1	0	0	0	1	100.00
M810	NHC-250	2	0	0	0	2	100.00
MW24C	TT2421-1	1	1	0	0	2	50.00
UIC TOTAL >>>>>>		16	3	0	0	19	84.21

SORT CODE: 065

UIC NO.: WABOTO ACTIVE

UNIT: 1ST BN 5TH SPECIAL FORCES

COMMANDER

NON-AERONAUTICAL

COMPONENTS ENROLLED IN AOAP

REPORT PERIOD ENDING 31 Mar 94

FOR FT. CAMPBELL

REPORT DATE: 19 APRIL 1994

BY DATE SAMPLE TAKEN

ATTN: AOAP POC

FT CAMPBELL, KY 42223-5000

BUMPER NUMBER	END-ITEM MODEL	END-ITEM SERIAL NO.	COMPONENT MODEL	COMPONENT SERIAL NO.	COMP HSOH	COMP HSOC	SMP HRS/DAY	INTDATE SAMPLED	REMARKS REASON SAMPLED
1D50	M35A2	012523540	LTD-465-1D	3988131	806	806	100/ 90	6Oct92	Routine
1D48	M35A2	012528596	LTD-465-1D	3993317	123	123	100/ 90	6Oct92	Routine
1D23	M35A2	012530980	LTD-465-1D	18009	406	406	100/ 90	6Oct92	Routine
1B3	M35A2	012532392	LTD-465-1D	3887827	27	27	100/ 90	6Oct92	Routine
1C3	M35A2	012533151	LD-465-1C	3924499	1669	1669	100/ 90	6Oct92	Routine
1A3	M35A2	022512765	LDT-465-1C	3900220	0	0	100/ 90	8Aug92	Routine
1B2	M35A2	022515329	LDT-465-1C	3802058	1190	1190	100/ 90	5Nov92	Lab Request
1D44	M35A2	022520253	LDT-465-1C	3807737	2202	220	100/ 90	22Sep92	Routine
1A2	M35A2	022522251	LDT-465-1C	3900592	1360	1360	100/ 90	5Nov92	Lab Request
1D27	M35A2	052525362	LDT-465-1C	3936051	1868	1868	100/ 90	5Nov92	Lab Request
1C2	M35A2	052525533	LD-465-1C	3889076	1765	1765	100/ 90	5Nov92	Lab Request
1D22	M35A2	053914027	LD-465-1C	3870176			100/ 90	3Nov92	Routine
1D25	M35A2C	054010373	LD-465-1	3831769	2461	2461	100/ 90	3Nov92	Routine
1D52	M35A2C	054010675	LDT-465-1C	3901222	1111	1111	100/ 90	22Sep92	Routine
1D24	M35A2	054012745	LDT-465-1C	3900520	11	11	100/ 90	7Oct92	Routine
1D49	M35A2C	054013570	LDT-465-1C	3900417			100/ 90	6Oct92	Routine
1D45	M35A2	054065909	LDT-465-1C	4886547	1209	1209	100/ 90	22Sep92	Routine
1D70	M10A	1004	HYD SYS	1004	427	302	0/365	7Oct92	Routine
1D70	M10A	1004	IHC S-700	1124678	302	302	50/ 90	3Nov92	Routine
1D70	M10A	1004	IHC DT-466B	79941	302	302	50/ 90	22Sep92	Routine
1D69	M936A2	1032AA026	HYD SYS	1032AA026	326	326	0/365	4May92	Routine
1D69	M936A2	1032AA026	MT 654	2420116480	34	29	100/ 90	22Sep92	Routine
1D69	M936A2	1032AA026	6CTA-8.3	44310302	342	342	100/ 90	22Sep92	Routine
1D51	M35A2	13446	LDT-465-1C	3904243	10059	1005	100/ 90	22Sep92	Routine
1D68	M923A2	2303323	MT 654	2420131371	177	177	100/ 90	6Oct92	Routine
1D68	M923A2	2303323	6CTA-8.3	44495233	177	177	100/ 90	6Oct92	Routine
1D26	M35A2C	30887	LDT-465-1D	821274T	210	209	100/ 90	22Sep92	Routine
1D46	M923	C52303394	NHC-250	11148480	546	546	100/ 90	6Oct92	Routine
1D46	M923	C52303394	MT 654	2420022752	488	488	100/ 90	6Oct92	Routine
1D47	M923	C52305301	NHC-250	111848480	385	385	100/ 90	15Oct92	Routine
1D47	M923	C52305301	MT 654	2420030705	373	373	100/ 90	22Sep92	Routine
1D48G	MEP-005A	RZ53532	D298ERX37	3468285	1894	1894	50/ 90	6Oct92	Routine
1D50G	MEP-005A	RZ53750	D298ERX37	3452512	1055	1055	50/ 90	22Sep92	Routine
1D51G	MEP-005A	RZ53754	D298ERX37	3452855	395	395	50/ 90	22Sep92	Routine

TOTAL END ITEMS ENROLLED = 28
TOTAL COMPONENTS ENROLLED = 35

NON-AERONAUTICAL
COMPONENTS ENROLLED IN AOAP AT FT. CAMPBELL
REPORT PERIOD ENDING
19 Apr 94

GRAND TOTAL OF END ITEMS ENROLLED = 28
GRAND TOTAL OF COMPONENTS ENROLLED = 35

NONAREONAUTICAL LABORATORY WORKLOAD SUMMARY
REPORT DATE: 18 April 1994
AT FT. CAMPBELL
1 OCT 1992 - 31 OCT 1992
----------FOR SAMPLES RECEIVED----------

SORT CODE	UIC	UNIT NAME	--------UNIT SUMMARY-------- END ITEMS	EI % UNK	USG COMP.	% DEL.	--------TYPE SAMPLE-------- FEEDBKS REQ'D	TOTAL	LAB ROUTINE	REQ.	OTHER	--LAB RECOMMENDATION-- NORM.	RESAMP	OIL	CHG INSP
212	WABOTO	MAINTENANCE DIV.	19	15.79	19	0.00	0	19	19	0	0	16	3	0	0
TOTALS FOR UIC'S SELECTEC FOR SORT CODE 212			19	15.79	19	0.00	0	19	19	0	0	16	3	0	0

NON-AERONAUTICAL LABORATORY WORKLOAD SUMMARY REPORT DATE: 18 April 1994

AT FT. CAMPBELL

1

CT 1992 - 31 OCT 1992 ----------FOR SAMPLES RECEIVED----------

SORT CODE	UIC	UNIT NAME	--------UNIT SUMMARY-------- END ITEMS	EI %	USG UNK	COMP.%	DEL	------TYPE SAMPLE------ FEEDBKS REQ'D	TOTAL	ROUTINE	LAB REQ.	OTHER	--LAB RECOMMENDATIONS-- NORM	RESAMP.	CHG OIL	INSP
GRAND TOTALS FOR ALL SORT CODES			19	15.79	19	0.00	0	19	19	0	0	16	3	0	0	

NON-AERONAUTICAL

LABORATORY RESPONSE TIME FOR SAMPLES RECEIVED

REPORT DATE: 18 April 1994

By Ft. Campbell

1 Oct 1992 - 31 Oct 1992

SORT CODE	UIC	UNIT	NAME	TOTAL SAMPLES	AVG TIME IN DAYS	0 DAYS	1 DAYS	2 DAYS	3 DAYS	4 DAYS	5 DAYS	6 DAYS	7 DAYS	8 DAYS	9 DAYS	10 DAYS	OVER 10 DAYS	UNKN DAYS
TOTAL ALL LAB DAYS	>>>>>>>			19	0.16	16	3	0	0	0	0	0	0	0	0	0	0	0

NON-AERONAUTICAL
USAGE & SAMPLE STATUS REPORT

SORT CODE: 065
UIC NO.: WABOTO ACTIVE
UNIT: 1ST BN 5TH SPECIAL FORCES
COMMANDER

REPORT PERIOD ENDING 31 Mar 94
FOR FT. CAMPBELL
REPORT DATE: 18 APRIL 1994
BY DATE SAMPLE TAKEN

ATTN: AOAP POC
FT CAMPBELL, KY 42223-5000

BUMPER NUMBER	END ITEM MODEL	END-ITEM SERIAL NO.	E/I	METER READING	COMPONENT MODEL	COMPONENT SERIAL NO.	SAMP NUM	SAMPLE TAKEN	NEXT DUE	DAYS DELINQ	DATE FEEDBACK SAMP	REQUIRED NO.	DATE	REMARKS
1D50	M35A2	012523540	M	81021	LDT-465-1D	3988131	934	06OCT92	04JAN93					
1D48	M35A2	012528596	M	6172	LDT-4651D	3993317	929	06OCT92	04JAN93					
1D23	M35A2	012530980	M	4286	LDT-465-1D	18009	933	06OCT92	04JAN93					
1B3	M35A2	012532392	M	5901	LDT-465-1D	3887827	935	06OCT92	04JAN93					
1C3	M35A2	012533151	M	12754	LD-465-1C -ENG	3924499	932	06OCT92	04JAN93					
1A3	M35A2	022512765	M	27165	LDT-465-1C	3900220	174	08AUG92	06NOV92					
1B2	M35A2	022515329	M	24608	LDT-465-1C	3802058	648	05NOV92	03FEB93					
1D44	M35A2	022520253	M	1	LDT-465-1C	3807737	2644	22SEP92	21DEC92					
1A2	M35A2	022522251	M	55630	LDT-465-1C	3900592	649	05NOV92	03FEB93					
1D27	M35A2	052525362	M	11459	LDT-465-1C	3936051	647	05NOV92	03FEB93					
1C2	M35A2	052525533	M	313356	LD-465-1C -ENG	3889076	646	05NOV92	03FEB93					
1D22	M35A2	053914027	M	12085	LD-465-1C -ENG	3870176	434	03NOV92	01FEB93					
1D25	M35A2C	054010373	M	62486	LD-465-1 -ENG	3731769	431	03NOV92	01FEB93					
1D52	M35A2C	054010675	M	23731	LDT-465-1C	3901222	2643	22SEP92	21DEC92					
1D24	M35A2	054012745	M	229	LDT-465-1C	3900520	1299	07OCT92	07OCT93					
1D49	M35A2C	054013570	M	389579	LDT-465-1C	3900417	936	03NOV92	01FEB93					
1D45	M35A2	054065909	M	50010	LDT-465-1C	4886547	2640	22SEP92	21DEC92					
1D70	M10A	1004	M	31	HYD SYS -HYD	1004	1213	07OCT92	07OCT93					
1D70	M10A	1004	M	325	IHC S-700 -XMSN	1124678	430	03NOV92	01FEB93					
1D70	M10A	1004	M	310	UGC DT-466B -ENG	79941	2818	22SEP92	21DEC92					
1D69	M936A2	1032AA026	M	10770	HYD SYS -HYD	1032AA026	385	04MAY92	04MAY93					
1D69	M936A2	1032AA026	M	10973	MT 654 -XMSN	2420116480	2637	22SEP92	21DEC92					
1D69	M936A2	1032AA026	M	10973	6CTA-8.3 -ENG	44310302	2642	22SEP92	21DEC92					
1D51	M35A2	13446	M	42112	LDT-465-1C	3904243	2639	22SEP92	21DEC92					
1D68	M923A2	2303323	M	7475	MT 654 -XMSN	2420131371	939	06OCT92	04JAN93					
1D68	M923A2	2303323	M	7475	6CTA-8.3 -ENG	44495233	937	06OCT92	04JAN93					
1D26	M35A2C	30887	M	6704	LDT-465-1D	821274T	2641	22SEP92	21DEC92					
1D46	M923	C52303394	M	14778	NHC-250 -ENG	11148480	931	06OCT92	04JAN93					
1D46	M923	C52303394	M	14778	MT 654 -XMSN	2420022752	938	06OCT92	04JAN93					
1D47	M923	C52305301	M	104797	NHC-250 -ENG	11184543	2308	15OCT92	13JAN93					
1D47	M923	C52305301	M	104797	MT-654 -XMSN	2420030705	2636	22SEP92	21DEC92					

TOTAL END ITEMS ENROLLED = 24
TOTAL COMPONENTS ENROLLED = 31
TOTAL END ITEMS WITH NO USAGE REPORTED = 0

TOTAL RECOMMENDATIONS WITH FEEDBACK = 0
TOTAL COMPONENTS DELIENQUENT = 0
PERCENTAGE OF END ITEMS WITH NO USAGE REPORTED = 0.00